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- Viable Deepsea Trawling Results from the Contl. Slope with 15m Trawler, of CIFNET Design
- Tuna LL Pilot Project: MOU signed
- Goldfish Breeding
- Role of Dietary Vitamin C in Panaeid Shrimp

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NATIONAL FISHERIES JOURNAL OF INDIA

Vol. 21 No. 7
OCTOBER 2001

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SHRIMP 2001

(Fourth World Conference on the Shrimp Industry and Trade and Buyer - Seller Meet)

Organised by INFOFISH, in association with FAO-Globefish, MPEDA and the SEAI, and held in Chennai, India, from 27-29 Sept 2001, this Conference was a great event, participated by a galaxy of international and national delegates. Presentations on information-laden and thought - provoking topics were made by several of them. For instance, out of several excellent presentations made one would carry memories of presentations by : George Chamberlain, Celia R Lavilla - Pitago, George V Brown, Jose Cyriac, Sudarshan Swamy, Helga Josupiet, and several others. A detailed 16-page illustrated report. 7

Tuna Pilot Project : MOU Signed

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Several 15 m LOA long trawlers do operate in the Indian EEZ but not beyond the shelf zone. Upgrading the machineries as part of an improved design, C.P. Verghese, Director, CIFNET, succeeded in developing a 15 m LOA trawler, based on an improved design, well equipped for trawling on the continental slope of south-west coast for deepsea prawn and lobster. Commercially-oriented trial fishing with the vessel has yielded economically viable results. This 15 m LOA version is a major improvement over the existing design, entailing low additional investment and is a model for utilising resources of the slope at conducive working costs 31

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Estd : 1981

Visakhapatnam, India

Vol. 21 No. 7
OCTOBER 2001

FISHING CHIMES

On Aggregated National Fisheries Administration

Mr. Nitish Kumar, the then Union Minister for Agriculture, while speaking at the Special Fish Farmers' Day function held at the Central Institute of Fisheries Education, Mumbai on 10th July 2001, voiced the determination of his ministry to take the needed steps for upgradation of the Fisheries Division in the Department of Animal Husbandry and Dairying into a separate Fisheries Department. He had explained that this upgradation which was long overdue, was essential to bring about faster development of inland and marine fisheries resources of India for national benefit. In this context, he referred to the long standing demand from various fisheries organisations of the country for this reform. It was pointed out that the process of fisheries development was getting retarded due to lack of linkages in respect of decisions for promotion of the developmental effort among the concerned union departments that handle various aspects of fisheries.

Fisheries Research is the domain of ICAR, which functions under the control of Union Department of Agricultural Research and Education. The results of fisheries research, in general, fail to reach the field for application, for want of needed co-operation and co-ordination from other agencies concerned. Post experiences reveal that, at the time the central fisheries research institutes were under the Fisheries Division of Union Department of Agriculture, speedier transfer of technologies was taking place. Composite fish culture and carp hatchery technologies could be disseminated in the field without time lag. Compared to this, it is now seen that, as examples, freshwater and marine pearl culture and other technologies, developed by central research institutes after the separation of fisheries research establishments from the Union Department of Agriculture could not be extended effectively to the field. So is the case more or less with seabass culture. The work being done at Central Marine Fisheries Research Institute (CMFRI), and Fishery Survey of India are complementary to each other. With the former being under ICAR and later under Union Department of Animal Husbandry and Dairying, there is inadequate co-ordination which has the effect of delaying developmental process. The resource estimates made by CMFRI and the survey work of Fishery Survey of India do not move in unison, which was not the case when CMFRI was under Union Department of Agriculture. There are several instances of such lack of co-ordination, leading to developmental setbacks.

Government have recently expanded the list of items that can be imported with licenses issued by Director General of Foreign Trade who functions under Ministry of Commerce. As part of this, several licenses for imports of fishing vessels have been issued initially by the aforesaid Directorate under the Ministry of Commerce, without ascertaining the impact of issue of such permissions on marine fishery resources. Only when the Union Fisheries Division pointed this out, although after some damage to resources was done, the need for taking prior clearances from the Union Fisheries Division was realised. The Mercantile Marine Department under Ministry of Shipping and Transport is understood to have registered the imported vessels as Indian vessels. In doing so, it is observed by several that the non-conformity of some of the specifications of these imported vessels with those of India has been overlooked. Several other lacunae in the agreements between buyers and sellers and in operational aspects were commented upon. For example, Thai-built trawlers, which ostensibly came to be owned by Indian enterprises, were seen to be relently fishing in coastal waters along upper east coast, to the utter disadvantage of Indian fishermen. All these would not have taken place, had the process of issuing import licenses and registrations was initiated at the level of subject-matter ministry.

One can see the relevance of observation of Mr. Nitish Kumar, the then Minister for Agriculture to aggregate all matters related to fisheries and place them under the control of a separate Union Department of Fisheries to be formed under the Ministry of Agriculture. Such a set-up would bestow on this new department greater onus and responsibility in handling all matters related to fisheries. For instance, when an enterprise wants to import a vessel the application would then first go to this Department, from where, with the needed clearance will go to Director General of Foreign Trade. Such a channelised system would provide the needed safety to the resources and protection to national interests. The same logic would apply for registration of fishing vessels by MMD, and on apprehensions of foreign fishing vessels by coastguard. Several exemptions, subsidies and so on presently given by various departments to the fisheries sector would also get

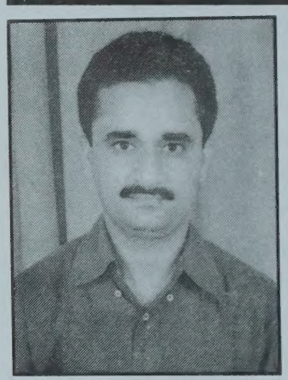
duly co-ordinated, if proposals reach the Fisheries Department first for scrutiny and clearance.

The nation deserves to have a separate fisheries department. It has a coastline of over 8000 km, one million fishermen, a couple of lakhs of traditional boats, over 40,000 mechanised boats and 70 nos. of surviving larger trawlers out of a strength of 200 nos. a decade back. Had there been a separate fisheries department, the decline in fleet strength would have been arrested, and multipurpose vessels for exploitation of demersal and pelagic fisheries would have been introduced. Above all, Indian fisheries development would have been in harmony with those of other nations, atleast of smaller ones such as Srilanka and Maldives which have made great strides in tuna fishing. In culture sector too, while there was progress, India lags behind in various respects even in comparison with smaller nations in Central America. The main reason for this situation is the absence of a separate Union Fisheries Department.

The earlier view held by the government that the work load in respect of fisheries is not adequate to warrant the formation of a separate department, to say the least, sounds hollow. One cannot expect workload to go up when determined and devoted steps are not taken to utilise the available resources effectively for national benefit. When the present divisional set up could result in an annual production of 5.4 million t per annum (and 7th position among world nations in fish production until recently, which has now dropped down to 8th position, for obvious reasons), earning 1.4 billion US$ in foreign exchange, one can imagine the great strides the sector can make, if only it is elevated to the status of a department. Here it has to be mentioned that, among all states of India, West Bengal has been consistently occupying top position in production, mainly because it has a separate department for fisheries at government level.

In the above background, although Mr. Nitish Kumar is presently not the Agriculture Minister, his public official pronouncement needs to be brought to the attention of the present Minister for Agriculture, Mr. Ajit Singh by the Union Fisheries Division to enable him to follow-up the proposal made by his predecessor, to its logical end.

Sunit Kumar Singh Honoured : Bags two International Awards



Mr. Sunit Kumar Singh

Mr. Sunit Kumar Singh, Senior Research Fellow, National Bureau of Fish Genetic Resources, Lucknow has been awarded with "Skinner Memorial Award" of Kansas Cooperative Fish and Wild Life Research Unit, Kansas State University, USA and also "Travel Award" of Indiana Department of Natural Resources, Washington, USA for his outstanding academic achievements in the field of Fisheries Science. The awards were conferred during the "Annual Fisheries Meeting" at Arizona, USA.

Sunit Singh has a long association with education and research in Fisheries Science. He happens to be the U.P. State Representative of the monthly Indian Journal *Fishing Chimes*.

Sunit obtained his B.F.Sc. degree from College of Fisheries Sciences, G.B. Pant University of Agriculture & Technology, Pantnagar in 1996 and M.F.Sc from Central Institute of Fisheries Education (CIFE), Mumbai. His area of specialisation is Fisheries Genetics & Biotechnology. He completed his P.G. thesis work on Fisheries Cytogenetics under the guidance of Prof. W.S. Lakra, Head, Fish Genetics & Biotechnology, CIFE, Mumbai.

Sunit Kumar Singh earlier received the prestigious Vice Chancellor's gold medal from G.B.Pant University, in recognition of his being the Best Graduating student of College of Fisheries Science, Pantnagar.

Sunit Kumar is a life member of several leading professional scientific societies. Mr. Singh has been contributing U.P. Newsletter to *Fishing Chimes* for last several years. He has published many popular articles, review papers and many news letters in different reputed science magazines and journals.

Mr. Singh has also received many other awards in the past, namely "Young Scientist Award" from M.M.M. Engineering College, Gorakhapur and Best Paper Presentation Award "Scientilla - 96" from Harcourt Butler Technological Institute, Kanpur (U.P.)

Singh is highly thankful to all his teachers i.e., Dr. W.S. Lakra, CIFE, Mumbai, Dr. I.J. Singh and Dr. U.P. Singh, G.B.P.U.A & T, Pantnagar and the ex-vice chancellor of CIFE, Mumbai, Dr. S.A.H. Abidi for their kind guidance, moral support and encouragement during his studies.

Indian team in Karachi to bring back fishermen

An Indian delegation is reported to have arrived in the port city of Karachi October 7 to bring back 196 detained Indian fishermen proposed to be released by Pakistan along with their boats.

The delegation comprises officials from the Fisheries Department of Gujarat and representatives of mechanised fish boat owners and fishermen's associations.

The Indian High Commission in Pakistan is reported to have said that Indian officials would examine the seaworthiness of the boats seized by Pakistani authorities when they arrested the fishermen for allegedly intruding into Pakistani waters. They said Pakistani authorities had agreed to release the fishermen as soon as the boats were repaired and handed over.

SHRIMP 2001

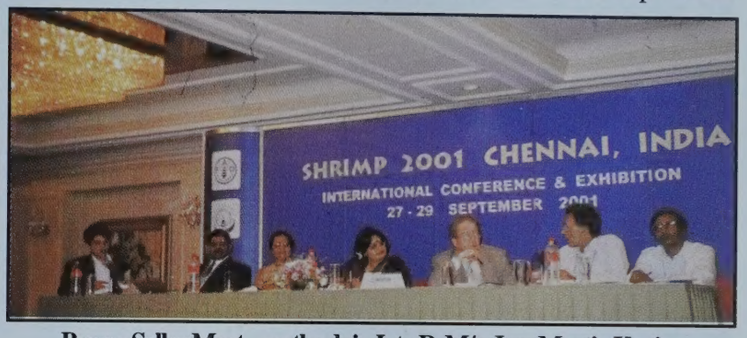
(Fourth World Conference on the Shrimp Industry and Trade and Buyer-Seller Meet)

HOTEL LE ROYAL MERIDIEN, CHENNAI

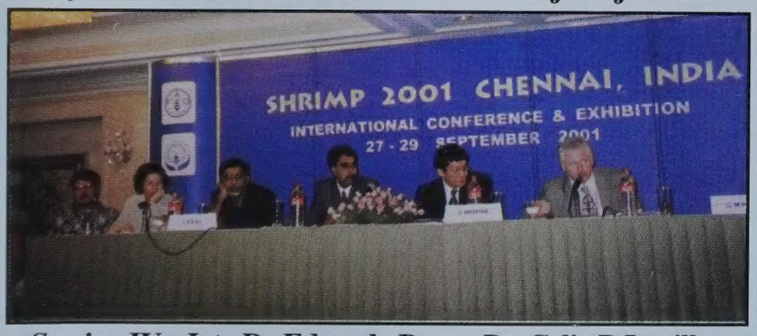
27-29 September, 2001

The Fourth World Conference on Shrimp Industry organised by INFOFISH in collaboration with FAO-Globefish, the Marine Products Export Development Authority of India (MPEDA) and the Sea Food Export Association of India (SEAI) was held at hotel Le Royal Meridien, Chennai, from 27-29 September 2001. The three day programme included four Sessions. The event was well attended. There were over 200 delegates. There was a nifty exhibition set up as part of the event, where an array of products mostly connected with shrimp aquaculture, were displayed.

Session I ~ on the dais. L to R : Mr. Elias Sait, Dr. S. Subasinghe, Dr. George Chamberlain and Messers. Jose Cyriac, Paiboon Ponsuwanna and Ms. Nirja Rajkumar.



Buyer-Seller Meet ~ on the dais. L to R. M/s. Jose Martin Xavier, Sudarshan Swamy, Ms. Anwara Begum, Ms. Nirja Rajkumar, Dr. Brian Hunter and M/s. Khairul Azam and Khan Md Belayet Hossain.



Session IV ~ L to R : Edgardo Reyes, Dr. Celia R Lavilla-Pitogo, Mr. Elias Sait, Dr. Tarlochan Singh, Mr. Paiboon Ponsuwanna and Dr. Mike Dillon.

Closing Session ~ L to R : Ms. Nirja Rajkumar, Mr. Elias Sait, Dr. Subasinghe, Paiboon Ponsuwanna, Dr. Helga Josupeit and Mr. R. Ganapathy

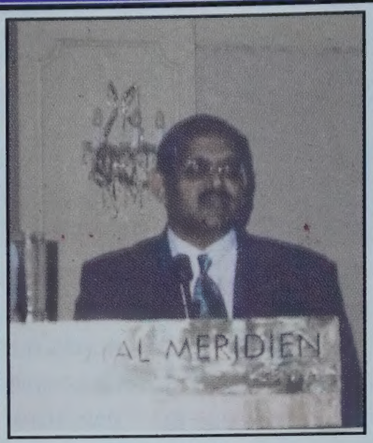
The Conference was inaugurated by Ms. Nirja Rajkumar, Joint Secretary (Fisheries), Government of India, by lighting the traditional lamp. Earlier to the inauguration, the participants were welcomed by Dr.Subasinghe, Director, INFOFISH and Mr.K.Jose Cyriac, Chairman, Marine Products Export Development Authority of India.

Mr. Elias Sait, President, Sea Food Export Association of India, spoke on the activities of the Association. He said that SEAI's activities were not restricted to export efforts alone. It took active interest in capture and culture aqua production including the operational aspects of shrimp hatcheries too, as seafood exports were intimated related to this activity. It also interacted with various importers' Associations abroad. It endeavoured to promote the interests of its members as well as those of the fishing industries, he added. Mr. Elias Sait, while pointing out that the World Seafood Scenario was gloomy, expressed particular concern over the steep fall in shrimp export prices which went down by 45% in the recent months. Producers as well as exporters were facing the problem of the negative trend that had set into the trade. He hoped that the prices would come back to normalcy soon. If this did not happen, there would be no incentive whatsoever to the farmers and exporters. The effect of this would be total depression in the Indian fishing industry, he said .

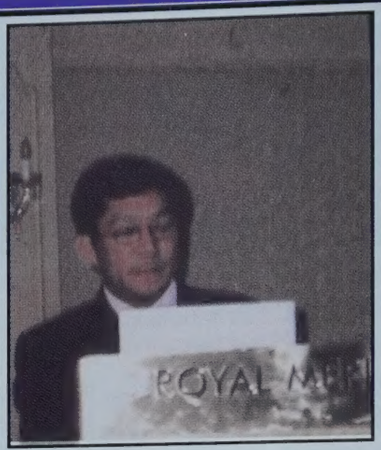
He voiced the need for joint representation from all sectors of the industry for the reduction of various duties levied, for bringing down the cost of production of the exported products . Bringing out the environment-friendly nature of shrimp aquaculture, he clarified that out of 1,41,837 ha under shrimp culture in India, more than half was covered by extensive farxming system and the rest was based on improved extensive practices. This status clearly established that shrimp aquaculture in India was totally

Some of the Speakers at the Sessions

George Chamberlain



Sudarshan Swamy



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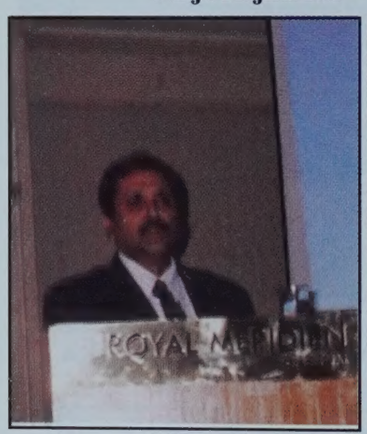
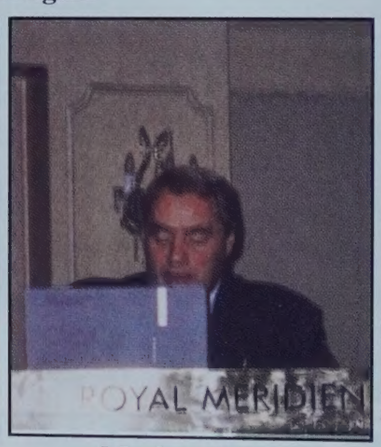


Jose Cyriac

Mike Dillon



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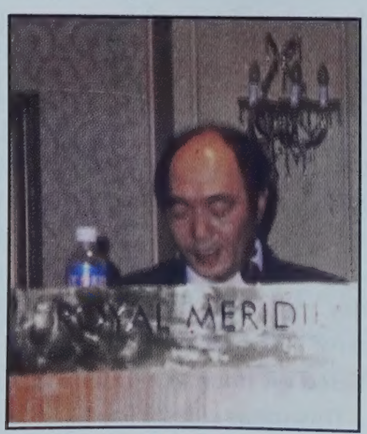

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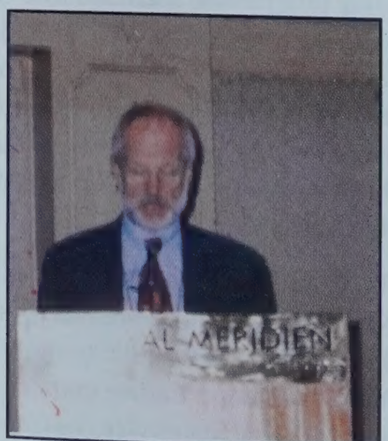

Mike Urch

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Audun Lem

Jose Martin Xavier

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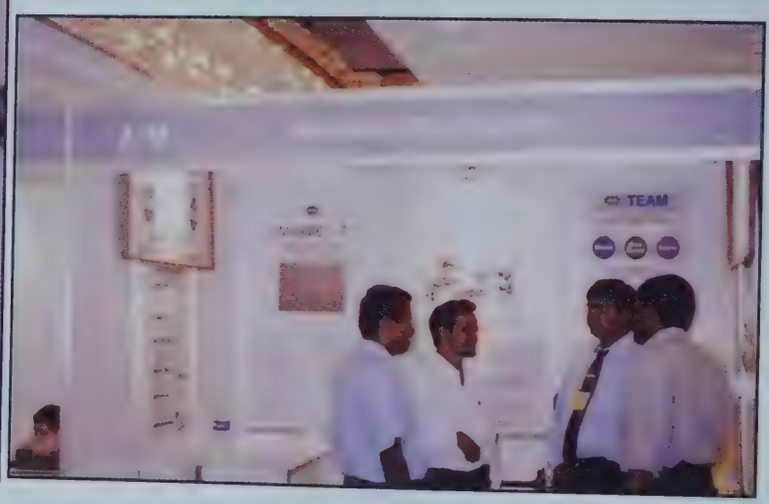

M/s. Marine Technologies

MPEDA

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Global Aquaculture

Gold Coin Biotechnologies

environment-friendly. He added that the present problem was not related to raw material production but to the gloomy export scenario. It was appealed that the delegates would have to address this problem.

Nirja Rajkumar, in her inaugural address said that there was vast potential for stepping up aquaproduction in the inland States of India, oriented towards export. The participants were told that the government was embarking on a major programme for the development of export-oriented culture fisheries in the inland States of the country as well, in order to bring the activity under an organised system. There were already signs of vibrancy in the inland culture sector of India, she added.

SESSION I

Presided over by Mr. Jose Cyriac, this session was devoted to Global Overview of shrimp industry. George Chamberlain, President, Global Aquaculture alliance, USA, made an inspiring presentation on "Sustainable Shrimp Farming: Issues and Non-issues". He had pointed out that the environmentalists were misleading the consumers with unsubstantiated information on effects of aquaproduction on coastal environment. It was mentioned that, in general, they presented only one side of the story, grossly exaggarated. It was explained that environmental groups proliferated and competed with each other to capture public attention and raise funds. There was a tendency on their part to misrepresent facts. Unfortunately, the exaggarated versions disseminated by them generated emotions, but these could last only for sometime as the consumers began to grasp and appreciate the actual position in the right perspective. This emotional phase was waning fast and would be over soon, he observed.

Birth of GAA stemming unjustified anti-aquaculture allegations: In order to counter the challenge posed by the environmental groups, and with a view to furthering environmental responsibilities in aquaculture to meet world food needs, Global Aquaculture Alliance was founded in 1997, he explained. One of the first challenges GAA was engaged in countering was the allegation about the adverse environmental impact caused by shrimp farming. It was striving to remove inefficiencies in culture systems by encouraging adoption of new technologies that took care of elimination of possible environmental hazards. Global Shrimp OP: 2001 had been organised to be held in late November 2001 in this context. The claim of the activitists, the most untenable of all, was that shrimp farming was the major cause of destruction of mangroves round the world. The factual position, however, was that mangroves formed a highly productive ecosystem which was crucially important to conserve. 18 million hectares of mangrove area was estimated to be existing now round the globe, but a substantial extent of this resource had been destroyed. This destruction was wrongly attributed to the setting up of shrimp farms which covered just an extent of 1.4 million ha, as in 1996. These farms covered less than 7.6% of mangrove area and accounted for less than 5% of global shrimp production. The real destruction was due to clearing of mangroves for agriculture, urban development, grazing, production of wood pulp and due to tourism. GAA in fact recommended mangrove conservation practice as one of its main code of practice for promotion of sustainable shrimp farming. As matters stood, the conversion of mangrove area for setting up new shrimp farms had essentially stopped all over the world and many denuded areas were being reforested, mainly because mangrove lands, being acidic in nature and lowlying are expensive for conversion into shrimp ponds, he added.

Chamberlain referred to another allegation leveled at aquaculture industry. This was that lot of fish meal went into production of feeds for shrimp culture and because of mounting requirements, fish meal production was going up denuding capture fishery stocks and thereby upsetting the environment. Explaining the hollowness of this comment, Chamberlain said quantity of industrial fish captured for conversion into fish meal had not at all gone up. He added that the fish meal production was stable at 6.5 million tons/year, with low value fish used traditionally as raw material for producing fish meal for using in feeds for raising fish, chicken and cattle. Aquaculture consumed 35% of world supply of fish meal and this proportion was stable. Saying this, he admitted that this might expand to 60% by the year 2010 but the additional requirements would be met through raw material substitutes such as soyabean.

Another accusation leveled at shrimp farming as mentioned by him was related to pollution caused due to discharge of organic waste from production centres. He said that this was an uncharitable accusation made to gain a point but that would not of course stand verification and it was also out of date. He clarified that over the past ten years shrimp farming had brought down the quantity of water discharged from shrimp farms by half, per kg of shrimp produced. It was also mentioned by him that in order to improve the situation further, GAA had recently developed quantitative effluent standards based on a comprehensive review of published data and effluent standards for other industries. Pointing out that GAA had also initiated a comprehensive survey of current operating procedures for shrimp farming on a global basis, he said preliminary results indicated that shrimp farming technology had come of age to make the activity totally environment friendly.

Concluding his presentation, Chamberlain remarked that the GAA recognised the need of sea food buyers and consumers to be better informed about the impact of the products they purchased on their health. He assured the consumers that shrimps were being increasingly produced by several farmers, using the highest environmental standards, as a follow up and in response to the aquaculture programme that had been developed by GAA. He mentioned that this programme was a four part process that included Awareness, Association, Compliance and Certification. It was ob-

served by him that certified farms under the programme would be eligible to use the "Best Management Practices" Certification Mark on the final product.

Indian Shrimp Production and Export in Global Setting: K.Jose Cyriac, Chairman, Marine Products Export Development Authority of India, spoke on the topic of "Shrimp Industry and Globalistion". He said: The global shrimp production had registered significant growth during the last two decades. It rose from 1.7 million t in 1980 to 3.5 million t by 1999. Shrimp production increased by 125% and trade turnover registered an increase of 200-300% during the period. While market tended to grow to accommodate the increased supplies, major markets had imposed strict quality standards mainly for the purpose of ensuring consumer food safety. These standards came in the form of HACCP Regulations prescribed by the U.S and E.U. and the International Sea Foods standards presented by CODEX ALIMENTARIUS. In general there was a trend of increased thrust towards value addition among the supplying countries. As a result, there was improvement in the quality of supplies. Probably because of the increasing share of value-added products in the overall exports, unit value of shrimp exports had shown an increase until last year. This year the market was experiencing signs of export values coming down for various reasons, mostly related to the importing countries, he said.

Cyriac mentioned that the industry had been adjusting its activities according to the needs of sustainable production and conservation of natural resources. He cited the examples of adoption of "TED" by the shrimp trawling sector and adoption of friendly culture practices by the farming industry. It was pointed out that globalisation had had its impact on the shrimp industry. Technological upgradation set in motion to meet global standards and to address environment concerns reflected this impact, he added. He, however, felt that in the matter of application of preferential tariff rates and management of non-tariff barriers covering matters such as sanitary and phytosanitary conditions, more of transparency was needed to be achieved.

Cyriac spoke on the trends of shrimp production in the South East Asian and other countries. He said: Culture shrimp production had been ruling shrimp exports of Thailand from 1994 onwards. In Indonesia, while capture fisheries predominated over culture sector, the later sector too had registered substantial growth. While Indian Shrimp production was characterised by the over riding importance of capture shrimp fisheries, culture shrimp production too had registered an upswing. While capture shrimp catches were now diminishing, now at a level of 250,000 t, culture production increased from about 70,000 t in 1998 to 97,000 t in 2000. Chinese exports of shrimps came down from 100,000 mt in 1990 to 50,000 mt in 1998. The culture shrimp production of Vietnam went up from 45,000 tonnes in 1984 to 200,000 t tonnes by 1998. The exports of that country went up from 10,000 mt in 1984 40,000 mt by 1998. It was also mentioned by him that the exports from Ecuador were predominently culture based. He said that imports by EU, Japan and USA went up progressively in the last decade. Saying that major markets for Indian shrimp were Japan, USA and EU he pointed out that there was a drop in the level of export of shrimp to Japan from India over the past five years. He added that exports to USA were facing certain challenges because of TED Legislation and automatic detention of cooked shrimp supplies from certain countries based on the level of preservation. He highlighted the fact that there was no change in the level of imported shrimp products by EU from India.

Cyriac referred to TED Legislation in USA. Commenting that targetting only on turtles in a composite environment raised several issues, one of which was that the capture of shrimp alone did not hurt turtle stocks. He said that because of the US legislation the present situation was that there was no escape from fitting TEDs in shrimp trawl nets. Speaking on environmental issues of shrimp culture, the Chairman referred to the problems of disease incidence in cultured shrimps and their impact on social economic condition of farmers, impact of conservation measures in shrimp capture fisheries and the problems in the adoption of the Code of Practices in the Exploitation of Capture Shrimp Fisheries and on environment friendly shrimp culture. The constraints imposed by the judgement of the Supreme Court in respect of shrimp culture in the CRZ were also referred to by him.

Paiboon Ponsuwanna, President, Thai Frozen Foods Association, spoke on "Thai Shrimp Industry - Heading towards more Value-Addition". The main point made by him was that the marine products exporters of Thailand had been diversifying into export of qualitative, viable, and value-added shrimps from Thailand. In order to be confident of the quality of the exported products, they had engaged a number of technicians, adept at value-addition to shrimp, from Japan, USA and EU. Out of import of 40,505 t. of shrimp by USA from January to May 2001, Thailand supplied 28,863 t, India 8045 t, and Vietnam 8018 t. The main route adopted by Thailand was to export shirmps by pieces (numbers) and no longer by weight. He also mentioned that Thailand was now number one exporter of shrimps to USA and number four to Japan. The export of raw shrimp to Japan from Thailand had come down to 18,657 t. in 2000 compared to 50,969 t. from India and 33,111 t. from Vietnam.

Governmental Initiatives in Indonesia: A paper authored by Bambang Suboko of Indonesian Fisheries Federation on "Shrimp Export - Processing Sector in Indonesia" was presented by Fatima Ferdouse. Saying that shrimp industry of Indonesia contributed substantially to the foreign exchange earnings of the country, the author explained that the total national shrimp production was over 340,000 t. of which 35% came from aquaculture. Indonesia exported a little over US$ 1.00 billion worth of shrimp in the year 2000. It was pointed out that, after the rapid expansion during the late 1980s and the early 1990s, the industry had been facing a lot of problems. It was mentioned that the disease problem crippled shrimp farming industry in 1993-

94 after which, for various reasons, the industry had been passing through up and downs. It was also observed that exports of frozen shrimp to Japan came down by 29% in 1999, compared to the previous year, although there had been a slight increase by 6.5% in the year 2000, as the political climate improved. It was mentioned by the author that the Government of Indonesia had initiated several steps for strengthening capability of national fishing fleets, strengthening surveillance and law enforcement to combat illegal fishing, improving the efficiency and productivity of fishing technology, improving efficiency and productivity of eco-friendly aquaculture production, upgrading post-harvest technology and quality control, improving the banking system to be more conducive for the needs of fisheries enterprises, diversification of export market, etc.

SESSION II

Presided over by Ms. Nirja Rajkumar, this session dealt with "Industry situation and outlook"

Latin America's Shrimp Industry Status and Problems: Santiago Caro Ros of INFOPESCA, Uruguay spoke on "Latin American Shrimp Industry - Present and Future Outlook".

In several countries of Latin America (Equador, Mexico, Colombia, Panama, Honduras), there had been a remarkable development of Shrimp culture activities which formed the backbone of shrimp exports. Presenting this picture, he went on to say that, all these countries had also suffered from serious problems during the last few years mostly related to devastating white spot disease attacks among culture shrimps and economic conditions. It was mentioned that the disease problem (which materialised in the wake of the bad effects of El *Niño*, and sweeping hurricanes in the Central American and Caribbean sub-continents), had not yet been solved. Another aspect mentioned was that in Equador the number of shrimp hatcheries came down from 293 to 8, mostly because of the disease problem. As the seed supplies became restricted, the annual losses due to fall in exports was very high during the last few years. Several farmers shifted to Tilapia culture in 2001, but the results had not been remarkable, for the reason that the survival rate was less than 20% to 25%. Many farmers had to give up this endeavour for the reason that no loans were forthcoming from Government / Banks. He said that the outlook of culture shrimp production was not very encouraging in Latin America.

Referring to Mexico, he said that the main shrimp production from this country was of capture. Explaining that there was a serious drop in culture shrimp output because of white spot disease and closure of shrimp hatcheries, he said that the industry had not yet recovered from the devastation caused by El *Niño* phenomenon. He placed the loss suffered by shrimp export sector of Mexico at around US $ 100 million. He said that in the Central American Countries, Panama, Costa Rica, Nicaragua, Honduras, Gualele, and Brazil, the dependency of the industry was mostly on foreign investment. So far as Brazil was concerned, he said that, unlike the other Latin American countries, the farming sector was flourishing because of concentration in the culture of *Penaeus vannami*. Earlier they had suffered because of failure encountered in the culture of *P.japonicus*, he added. It was highlighted that shrimp farming area in Brazil increased substantially with production going up by nearly 67-86 percent during 1996-99. He said that there were 16 shrimp hatcheries in the country with a production capacity of 500 million post larvae per month. The average shrimp production was 2.5 mt/ha. He mentioned that the farmers managed their farms well, having five crops per annum. He described the success in Brazil was due to institutional integration and investment available under priority area schemes. The industry took care of the culture operation in a manner that ensured disease prevention, genetic quality, nutrition, etc. Referring to Argentina, Satiago said that this country depended only on wild catches and there were record capture landings during last two years.

Emergence of Cultured Shrimp as mainstay of Indian Exports: Elias Sait, President, Seafood Exporters Association of India presented a paper on "Status of Seafood Industry in India with Specific Reference to Shrimp". Pointing out that Seafood exports from India registered a growth of nearly 25% in terms of Ind. Rs and 18% in terms of US $ during the last year, it was highlighted that the exports were of the order of Ind.Rs.64.5 billion (US $ 1.42 million). He clarified that the major contributor to exports was the aquaculture sector with a share of nearly 60%, which was poised to boost up its contribution to new heights in the years to come. Observing that more and more value addition to exported products was taking place in India, he prophesied that in the coming two years export of cooked IQF, trays and ready-to-use products for the super markets and ready-to-eat chains would form half of the total exports. Informing that considerable investment had been made for the upgradation of seafood processing plants of India, Sait mentioned that India now had 110 EEC approved plants (probably the highest number in the world) and nearly 250 processing plants approved for export to non-EU countries. Thus, some of the best processing plants in the world were located in India, he told the participants with pride. He added that all the processing plants had clearances from HACCP angle, while saying that India's exports were mainly to Japan (Qty: 15.66%: Value:39.73%); USA (Qty. 9.48% : Value : 18.07%) and Europe (Qty: 15.63% : Value : 15.91%).

Continuing his presentation, Elias said that, while the capture fishery contributed 219,890 t of shrimp last year, culture shrimp production from 1,41,837 ha. was 159,000 mt (official estimate 97,096 t), 95% of which was from extensive and improved extensive culture operations. Stating that bulk of shrimp aquaculture activities were located on the east coast, he clarified that semi-intensive and intensive culture systems had been totally abandoned because of disease problems. 238 shrimp hatcheries located all along Indian coastline produced eleven billion nos of seed annually, he mentioned.

While the bulk of capture shrimp production came from around 40,000 mechanised boats, the deep sea fishing fleet of the country which had now dwindled to 70 nos. accounted for only one percent of shrimp catches. The processing infrastructure consisted of 402 freezing units with freezing capacity of 8500 t at a time. There were 5 nos. surimi units and 50 plants were there with cooking facilities. The Export Inspection Council checked quality of exported products. Fisheries education was provided by several colleges and training was provided by Central Institute of Fisheries Nautical Engineering Training. He also mentioned that India occupied 17th position globally among exporting nations.

Truong Dinh Hoe, Deputy General Secretary, Vietnam Association of Seafood Exporters and Producers, spoke on"Shrimp Industry and Production of Organic Shrimp in Vietnam". Saying that seafood export of Vietnam accounted for over US $ 1.4 billion in 2000, an increase of 45% compared with the year 1999, he told the gathering that seafood was the third largest commodity of Vietnam and accounted for 10% of the total exports of the country, USA sharing 21.3% and PR China and Hongkong coming third with 19.1%. It was mentioned by him that the annual production of cultured black tiger shrimp in Vietnam had exceeded 100,000 mt, supported by a freezing capacity of 150,000 mt of finished products. The industry took great care about food safety requirements, adopting upgraded processing technology and quality management systems. He also said that the industry had taken to the manufacture of diversified products and also diversified the export markets. One of the achievements of the country, according to him, was that in 2000, preparation of value-added products constituted 50% of the total shrimp exported volume which was more than 70,000 mt., valued at US $650 million, an increase of 47% compared with the year 1999. The share of shrimps in the exported products was of the order of 47% of the marine products exports for the year 2000, the average price of shrimp obtained being US$ 9.90/kg, an increase of US $1.70 over 1999. Hoe said that the value target for the year 2001 for export of shrimp products was US$ one billion, despite the aberrance of a drop in the value of realisation by about 30% in 2001, which was much more than expected.

It was mentioned by him that several areas in Mekong Delta were devoted to farming of organic black tiger shrimp, following a method of sustainable and eco-friendly cultivation. He said that organic shrimp commanded a price 20-30% higher than the conventional product. It was a source of higher earning not only for the producers but also to the processors.

Markets for Coldwater Shrimp of North Atlantic: Petur Bjarnason, Chairman, Fisheries Association of Iceland, made an interesting presentation on "Coldwater Shrimp Industry in the North Atlantic". He said that *Pandalus borealis* was the main coldwater shrimp species exploited by Iceland, Canada, Greenland, Norway and Faroe Islands. The annual catch was usually between 3000 to 4000 t. He said that this pandalid shrimp spent first part of its life as male and later changed sex into female. Male part of life varied from 1 to 7 years. He said that the exploitation of this shrimp started after 1936. It was mentioned by him that when cod catches were poor, shrimp catches went up. He said that Canada was the leader in the exploitation of this coldwater shrimp. It was mentioned that the shrimp tasted better when eaten raw or in cooked and peeled condition. He said most of the catches were from the offshore zone where large sized ones of the species were found. The main market for shell-on raw shrimp was Japan and for shell-on cooked was EU. However, for cooked and peeled shrimp, the main market was UK, he added.

Mozambique's Shrimp Culture Expansion Plan: L. Palha de Sousa of National Institute for Fisheries Research, Mozambique, read a paper entitled "A Perspective on the Mozambican Shrimp Industry : Present status of the Fishery and Prospects for Aquaculture Development", authored by Fernando Ribeiro and himself. Observing that Mozambique's long coastline possessed important commercially exploited shrimp stocks divided into industrial, semi-industrial and artisanal type, he said that industrial production accounted for 85% of commercial catches. Fishing was carried out mainly in the Sofala Bank. Industrial production in the year 2000 accounted for 8,755 mt of exports worth US$76.6 million. This increase was due to an upsurge in fishing efforts in reaction to the management measures introduced covering mesh size and closed season. Notwithstanding this increase, the Government introduced closed season for one year and also reduced fleet strength in the year 2000. These measures, he said, had later resulted in 19% decline in fishing effort in 1992-94. However, the number of boats subsequently increased because of the good catches. He also mentioned that the Government had closed fishing/fishery to new entrants. Even so, the number of boats increased because of the good catches. It was apprehended that the relatively high effort, despite measures taken as mentioned, might further reduce the breeding stock and lead to resource overfishing.

In view of this situation, according to Palha, the trend was towards further increase in aquaculture production of shrimp, as encouraged by the Government. It was pointed out that Mozambique was blessed with several amenable penaeid shrimp species for farming. The country enjoyed an estimated 33,000 ha of potential water area for medium term development. Of this area, 75% was located within the mangrove zone. Two industrial farms were now in the process of construction in an area of 800 ha. Considerable investments were planned for the development of shrimp aquaculture sector. It was predicted that exports by 2005, on account of shrimp culture, might account for 30% of the present export level. He said that the planning and management in this regard were being studied in order to make the best use of the on-going interest among the investors and also to ensure avoidance of possible environmental

problems in the future. In other words, the tasks being addressed to by the Government and Stakeholders now were in respect of finalisation of masterplan for the development of aquaculture and the local framework there of, and for identification of suitable coastal lands for locating the farms.

Concluding, he said that land concessions for aquaculture development continued to be a particularly sensitive issue in the context of coastal environment management and the mangrove ecosystem.

J. Bojan of MPEDA of India sought a couple of clarifications from Petur Bjarnason. He wanted to know which fishing activity was considered lucrative, cod or shrimp fishing, by the fishermen of Iceland. He was told in reply that both cod and shrimp fisheries were important depending upon the seasonal conditions. Bjarnason agreed with Bojan that there was an inverse relation between cod and shrimp fishing fortunes. It was also clarified that he was not aware of any financial assistance given either in Iceland or in any other nearby country to intensify fishing for cod. So far as shrimp was concerned, he said that financial assistance to promote this fishery was not thought of as it enjoyed better returns.

Bojan wanted to know from Palha de Sousa of Mozambique the reasons for the anamolous situation of the number of boats increasing from the year 1996, after a drop in their number during the period 1992-94, despite several restrictions (fishing restrictions including ban period). He also wanted to know whether any assistance was being given to the fishermen during ban period. Replying to this, Palha de Sousa said that the Government had declared one year fishing ban with the hope that the fish population would go up to a substantial level which would be of benefit to fishermen. It was also clarified that no assistance whatsoever was given to the fishermen during the ban period.

SESSION III

Markets and Marketing was the subject considered at Session III. This session was presided over by Dr. Helga Josupeit of Globe Fish, FAO, Rome. Eight papers were presented at this Session, followed by a Technical and Investment Session and Buyer-Seller Meet.

Gloomy Japanese Picture: Katsuhiko Shimizu of Nichirei Corporation, Japan, presented a paper on the topic "Japanese Shrimp Market - Outlook and the future". He said that the shrimp market in Japan was influenced by macro-economic conditions. Shrimp suffered from competition from other products and their prices. The consumer demand for shrimp products and the cost of distribution of the product played a major role in the market conditions for shrimp. Salmon and other items competed with shrimp and a recent development he mentioned was that the consumption of processed shrimp had come down considerably. One aspect he mentioned was that the competition and the need for reduction in price had squeezed out middlemen and many of the importers had resorted to import of value-added shrimp. He told the participants that there were two categories of imports one inside and another outside the market channels. The former category, he said, was decreasing as the middlemen were being avoided. He mentioned that in Japan there were only two major distributors and the tendency was more towards the institutional route of supplying shrimps to supermarkets, restaurants, sushi-shows or noodle shows, fast food chains, etc. Till recently, proprietors of sushi shows were the major buyers of shrimp. Now this pattern was being replaced by other sectors. He said that sushi market prices were coming down. The noodle segment was also shrinking because of competition from others. It was also mentioned that the Tempora sector too was losing its importance. Saying that consumption in family restaurants was also decreasing, he indicated that this situation was now better in respect of sales at supermarkets. Retailers were facing a slow down because of competetion from other food products. Having said all this, the author observed that shrimp still continued to be an important consumable food product in Japan, despite the fact that there were efforts by others to sell items other than shrimp. He mentioned that de-frosted shrimp sales were quite encouraging. Food manufacturers were using frozen shrimp as they were a cheaper material. Because of these discouraging trends, imports had substantially declined, it was mentioned. He prophesied that shrimp prices might go down further. An added reason mentioned by him to support his prophesy was that the sizeable investments being made in shrimp farming in China and the flow of the produce into Japan would bring down shrimp prices further. In short, the presentation made by Katsuhiko was one of gloom so far as Japanese market was concerned. He expressed the view that, in future, exports of shrimp to Japan could only go up when delicious value-added items that would attract the attention of consumers picked up. It was also mentioned that microwoven food was much in demand in Japan and there was future for exports to restaurants catering to the needs of house wives who preferred ready-to-eat food supplies. The restaurants were now well equipped to supply micro-oven food within minutes of receiving an order.

USA's Food Service Industry to Strengthen Shrimp Trade: Gregory V Brown, Managing Director, GMRI, Inc, Singapore, spoke on "Catering/Restaurant Sector in the US Shrimp Market". He said that USA Restaurant industry was expected to reach a gross turnover of US$ 399 billion in the year 2001. It was mentioned that, according to the National Restaurant Association, the current situation was favourable for full service Restaurants compared with their limited service counterparts. The Association identified seafood as a promising category with much growth potential and most of the customers at these restaurants were in favour of shrimp as their favourite food. Major food service buyers were now focusing their attention towards shrimp factories in source areas like those in South East Asia for the reason that there had been a remarkable improvement in the sanitation, hygiene level and food

safety aspects in the recent years. He said that the trend was definitely away from green headless and towards value-added shrimps. The traditional relationship between buyer-broker-seller was fast changing to one of buyer-seller relationship with strong emphasis on transparency and communication, he added. A new trend that had emerged according to him was that specifications must be adhered to and fulfilled faithfully and shipments made on time. There were predictions, he said, that there would be a decline in shrimp consumption in USA, but the food service industry was not thinking on the same wave length. Several say that there was an opportunity for growth. The great middle class of America could actually see favourable growth in shrimp pricing and was optimistic that the continuing improvements in technology would lead to value addition rather than cost addition, he concluded.

Warnings from EU: A presentation of "European Shrimp Market:Trade and Quality Issues" was made by Olivier Hottlet, Managing Director, Hottlet Frozen Foods, Belgium. One suggestion of his was that the laboratories in exporting countries should be well equipped so that they could really find out whether any of the products were infected. He said that 12 samples of scampy imported from India were tested and found positive to *Solmonella*, but the fact was that the Indian laboratories could not record this at any stage prior to export. He told the participants that from 5 April 2002, the existing general system of preferences as of 1st January 2002 would be amended by EU and the new regulations of contamination (including heavy metals) would come into force from 5.4.2002. This regulation would however not apply to the products placed in the market prior to 5/4/2002, he clarified. He also mentioned that dioxins would also be brought under contaminant legislation effective from 5.4.2002. It was clarified that antibiotics could be used to some extent and within the regulations and the monitoring plan in this respect would take into account the withdrawal time of antibiotics. He said that chloramphenical had indicative side affects and it was often found in traces in imported Asian shrimps. He mentioned that chloramphenical was first found in imported shrimps in Austria by green peace in February 2001. Recently it was found in imported shrimps from China into Germany. It was mentioned by him that the cost of analysis incurred in the importing country to check whether antibiotics were present, would be to the account of the buyer. There would be a charge of US$200 per sample. He said that colour substance used as additives was important for those selling chilled shrimps, but not any more for those exporting frozen shrimp. The importance of giving full particulars such as country of origin, identification of the ship that approved the consignment on the labels was underscored by him. He suggested that the exporters should improve contacts with the authorities concerned in EEC in order to ensure that the problems of importers were neutralised. Exporters would have to realise their responsibilities in respect of quality of goods that were exported to EEC. Pointing this out, he said that exporters should encourage fish culturists and fishermen to realise their responsibilities and ensure quality. He also mentioned that a major problem faced was heavy metal contamination of the products exported by certain countries to EEC. He suggested that all consignments found to have an excess of contamination, should be destroyed. He felt that health certificates were not useful for the importers. For the reentry of the product after rejection, authorisation from the importing countries was essential. When the exported products were not cleared by the importing country, exporters would have to take back the goods and the amount paid back to the importer. He also emphasized the importance of compulsory and reliable insurance. He warned that the import conditions to EEC would soon be the toughest.

South Europe ~ Major Market for Shrimp: Audun Lem, Fisheries Industry Officer, FAO, Rome, spoke on "The Southern European Shrimp Market". Pointing out that Southern European countries were major importers and consumers of shrimp, he presented an overview of the markets in Spain, France and Italy. He said that Spain was the largest importer of shrimp in Europe. 95,000 mt. were imported in 1999. The demand was more for shell-on material, pink and white. Consumption outside homes was on the increase in Spain. The general trend was to add value to imported raw material locally. Spain was active in Joint Venture Fishing Projects abroad.

Describing the situation in France, Audun said that this country imported 73,000 mt. in 1999, of which 50,000 t were shell-on warm water species from African, Asian and Latin American countries. It was further mentioned that France was the second largest shrimp importing country in Europe, the domestic shrimp production being less than 1000mt. Saying that France was a dynamic shrimp market, he told the delegates that value addition was imparted within the country to the imported material. Whole cooked and chilled shrimps were popular in the retail market.

The import of shrimps into Italy was of the order of 41,000 t annually, supported by a strong growth in consumption. The consumers were quality conscious and 75% of shrimps imported were consumed outside homes. While it continued to be a traditional market in which most of the species were accepted, he said the country imported from Denmark coldwater fish and tropical shrimp in brine which were being sold all over the country in the past 7-9 years as popular items. Raw material was imported from various countries including India. Some of the exporters were directly selling to processors. Pointing out that product development had become an important activity for providing value-addition, he said that processing was done in such a manner that the products would be acceptable at the supermarkets. Supermarkets influenced products development and these markets had become the main channels for marketing, he explained. Indicating the future trends, Audun said that the these were towards ensuring quality through application of CODEX stan-

dards, HACCP, ISO-9000 and undertaking risk analysis. It was expected that the tariffs would be reduced over a time and non-tariff barriers related to shrimp such as TEDs might play a major part, he opined. Observing that there might be tariff escalation for processed products, Audun hinted that, Value-added products might attract increased tariff. He also spoke on fish trade in relation to food security. Concluding, he said that South Europe was a major market for shrimp. It was a quality conscious market with individual differences among countries.

Role of Norway's Speciality Fish Mongers' Shops: Mike Arch, Editor, *Fishing News International*, London, presented a paper on the "Norwegian Shrimp Industry", authored by Erik Hempel of Norway, in his absence. Pointing out that there were some 50 species of prawn in Norwegian waters, he said that only one species *Pandalus borealis* was the main target of commercial fisheries. There were some 12 land-based processing plants and several enterprises exporting a variety of shrimp products in Norway, it was pointed out. Although production of shrimp had increased in recent years (some 83,000 t. in 2000), according to him, it was now expected that the catches would decline. It was mentioned that over the past five years, Norwegian shrimp exports had increased steadily from 18,000 t. in 1996 to 43,000 t., valued US$170 million in 2000. Further growth was expected in 2001. One point made was that shrimp was the second most popular seafood item in Norwegian market after cod. Most of the shrimp was sold through super markets but there was a trend towards speciality shops managed by fish mongers which were gaining a larger market share. Norwegian imports had also increased in recent years, he said.

Giant Freshwater Prawn's Comeback: Fatima Ferdouse of INFOFISH presented a paper on "Shrimp Market and Trends in Non-Japanese Oriental Asia". She said that shrimp in Asian markets i.e., Singapore, Hongkong, Malaysia, PR China, Taiwan and Thailand were usually sold in live/fresh and chilled forms. The products fetched highly lucative prices compared to other international markets. In late 1997, the financial crisis that hit Asian countries encouraged more of exports out of Asia but curbed consumption of high value fishery products including shrimp, she said. Nonetheless, shrimp was still considered to be popular for occasional dining out and for festive seasons, she added. Saying that the giant freshwater prawn, which receded to the background with the advent of the black tiger and other marine shrimp, had staged a comeback in many Asian markets, she observed that, of late, the declining black tiger market prices had forced the local farmers and marketers to promote the giant prawn once again in domestic and regional markets. It was mentioned by her that the popularity of shrimp in South East Asian countries had also allowed development of several shrimp based by-products to cater to the taste of the regional consumers. These included shrimp crackers, shrimp paste cakes and granulates and preserved shrimp in jars, etc. These were popular inexpensive items for home consumption and they were regarded as ready-to-cook and ready-to-eat value- added products, she explained.

Fatima said that tropical shrimp were available almost round the year in Asia. Nonetheless, it was mentioned that cold water shrimp from Canada, Iceland and Denmark had also made their way to some of these markets. It was added that these coldwater shrimps were exported to China, Hongkong, Taiwan for local consumption as at present. It was also mentioned that even sushi shrimp was gaining market share in non-Japanese Asian markets.

Technical and Investment Seminar and Buyer-Seller Meet

As part of Session III, a "Technical and Investment Seminer and Buyer-Seller Meet" was conducted.

Bangladesh Packers need to earn Importer's Confidence: A paper on "Problems and Prospects of Shrimp Exports from Bangladesh" was presented by Khan Md. Belayet Hossain, Chairman, Bangladesh Fisheries Development Corporation, Bangladesh. Mentioning that 6.28% of total national export earnings came from Fisheries, Hossain said that shrimp exports comprised two freshwater species and nine marine species. Of these, the fresh prawn *Macrobrachium rosenbergii*, *Metapenaeus monoceros*, tiger shrimp *Penaeus monodon*, and white shrimp, *Penaeus indicus* were the important ones. He said that the processing industry, consisting of 125 plants was jolted by a sudden ban imposed by EU. In an effort to counter this, it had been possible to improve the standards in 55 processing plants with the desired EU standards. Several other plants were engaged in introducing HACCP procedures in their operations. Steps had also been taken by the Government to ensure hygienic conditions in the processing plants. It was mentioned that shrimp contributed 82% of the total value. Export earnings from shrimp increased from US$3.17 million in 1971-72 to US$349.75 million in 2000-01. It was mentioned that it would be possible to augment export earnings only through value-addition. He also narrated the main problem faced by the shrimp exporters, one of which was the lack of confidence on the part of foreign importers in the country's packers.

Shrimp Culture through Community Participation: Anwara Begum Shelly presented a paper entitled "Shrimp Culture through Community Participation - An Environmentally Friendly Approach under Sustainable Environment Management" authored by herself and M Mizanur Rahman and Atul Francis Sarker. She said that 141,352 ha of area was brought under shrimp culture and 63,164 t. of shrimp could be produced therefrom. It was unfortunate that shrimp culture had been termed as anti-environmental and blamed for causing loss of soil fertility etc., she observed. She said that it was alleged to have destroyed common property resources such as mangrove forests and canals. Despite these outrageous allegations, she expressed the general confidence that shrimp farming would continue as a beneficial activity for the nation. The Government of Bangladesh, viewing shrimp culture as a thrust industry, had initiated a Project

named "Sustainable Environment Management Programme (SEMP)" under the Ministry of Environment and Forest in the coastal area which was designed to counteract the alleged negative impacts of shrimp culture. Caritas Fisheries Programme, implemented as part of the substainable environment management programme had initiated environment friendly shrimp farming system, in partnership with SEMP. Under this system, no organic fertilisers and pesticides were used and paddy and shrimp rotational farming, raising crops on the bunds, raising fruit and vegetable crops on the bunds had been taken up. She said that this initiative imparted some good impacts in reducing salinity intrusion and disease, improved soil quality and increased production of both paddy and shrimp.

Quality Studies in Bangladesh: Khairul Azam spoke on the subject, "A comparative study related to organisational set up, microbiological quality standard and export performance of three frozen sea food companies in Khulna, Bangladesh". The results of this study showed that there were variations in the standard plate count in shrimp taken for sampling from these three factories. The counts for freshwater prawns also showed a similar pattern. He said that the total coliform counts decreased sharply in block frozen shrimp, for all the three companies. Faecal coliform results also showed a similar trend for the three companies. It was mentioned by him that no *Salmonella* spp *or Vibrio cholera* were observed in any of the products of the three companies.

Small-Scale Sector dominates Indian Culture Shrimp Production: Nirja Rajkumar presented a paper entitled "Environmental and Social Issues in Shrimp Aquaculture". Pointing out that 1.2 million ha of coastal land of India was available for conversion into shrimp farms, she said that presently 140,000 ha. in nine coastal states and in Pondicherry, representing 11-12% of the potential was brought under shrimp culture. The culture activity was dominated by the small scale sector with an average farm area of two hectares each. All of them followed extensive or modified extensive shrimp culture systems. Semi-intensive and intensive culture systems were no longer practised. An Aquaculture Authority was set up to promote aquaculture in an eco-friendly manner and to guide small scale shrimp farms to adopt environment friendly practices involving low stocking densities, and healthy water management. She said that the Activated Microbial Suspension System that would enable doubling of protein utilisation by shrimps, which took in grain pellets and filtered out left overs as microbial protein which were fed upon again, and successfully experimented upon in Belize farm ponds in Central America, as mentioned by Dr. Chamberlain, would be introduced for adoption by Indian farmers.

***Disease and Pollution on the Wane*:** Nirja Rajkumar said that the damage caused earlier by WSSV to shrimp crops was contained and the release of waste products from farms into open water systems had been brought down to a great extent. Efforts were on to promote interactive programmes to inculcate social consciousness among coastal stake holders, it was added. She hoped that the Aquaculture Authority would spread the truth about the importance of shrimp culture and its usefulness for the nation, while also explaining its environmental friendliness. It was also mentioned by her that FAO should play a bigger and more positive role in dispelling the misconceived notions all over the world on the effect of shrimp culture on environment. It was also felt that livelihood of the weaker sections of the society through shrimp culture should not be put in a disadvantageous position on unsubstantiated allegations in respect of shrimp aquaculture which was in fact a sustainable and environment friendly activity. She asserted that aquaculture was an activity yielding supplementary incomes to agriculturists and the need was in fact to encourage agriculturists to incorporate aquaculture as part of their agriculture activity.

***Co-op Chilling Units for Culture Sector Suggested*:** Referring to WTO, she said that its impact was not yet visible. She however conceded that it presented a challenging scenario particularly in respect of non-tariff barriers. She was not quite certain whether the use of TEDs was the only way of preventing the capture of turtles. She emphasised the importance of quality and hoped that the facilities in respect of quality control in the country would be brought to be at par with developed countries. It was mentioned that her department offered to provide a one time assistance of Rs.40.00 lakhs to the various coastal States, for developing fish landing centres, but unfortunately the scheme did not work out as there were not takers.

Concluding she appealed to the concerned to improve cleanliness at fishing harbours, to adopt sound quality control measures, to achieve quality upgradation, and to provide the needed forward and backward linkages. She suggested that Chilling units could be provided in the cooperative sector for the benefit of fish farmers and small fishermen and felt that this step could go a long way in eliminating distress sales.

Artemia Customs duty Reduction and Domesticated Broodstock Development: M.Sudarshan Swamy, President, Andhra Pradesh Shrimp Hatcheries Association, presented a paper on "Trends in Shrimp Aquaculture in India, with Specific Reference to Andhra Pradesh". He said the Shrimp Aquaculture Industry of India was strong and self-sustained with 74,227 ha (13% of available area) brought under shrimp culture, (production: 51,055 t) with an average yield of 621 kg/ha. Around 50,000 ha of area out of this was under traditional extensive method of Aquaculture and the rest was mostly under improved extensive system. An additional extent of 16,600 ha in low saline areas was also brought under shrimp culture, providing yield of 46,045 t. The total annual culture shrimp production (2000-01) was thus 97,100 t. He said that in the last 10 years, there had been an increase in the growth of the area under shrimp culture by 2 to 9% and shrimp production by 242%.

So far as shrimp hatcheries were concerned, Swamy said that there were 283

of them all along the coastline, with 180 of them located in A.P. State with a production capacity of 10,065 million against a total national capacity of 13,882 million. Next to A.P State , Tamilnadu and Pondicherry had 72 hatcheries with a capacity of 2933 million. There were 10 hatcheries in Kerala (100 million capacity), 9 each in Orissa and Karnataka (445 and 240 million capacity respectively), two in Maharashtra (51 million capacity), and one in Gujarat (48 million capacity).

It was mentioned that there were around 66 Shrimp Feed Mills, with the needed supporting infrastructure, valued at US$ 275 million.

Swamy pointed out that shrimp aquaculture of India was at a comfortable stage in early 1990s and thereafter there had been some measure of confusion in respect of environmental friendliness and sustainability which was attributed to the aggressive culture activities adopted by farmers and entrepreneurs. He added that these initiatives gave raise to several questions one of which was related to WSSV disease outbreak. Incidence of the disease resulted in heavy production losses. It was mentioned that, unfortunately there had been an overemphasis on the negative impacts which were, however, transient. During the period when the disease was active, there had been an annual loss of 12000 t. to 13000 t. of culture shrimp, valued at US$87 to US$100 million, it was observed. He said that the other major constraint to shrimp farming for some time was the intake of polluted waters. Fortunately, through proper water management, most of the farmers could eliminate pollution and had been able to produce normal crops, he said.

Swamy explained the problems faced in securing shrimp brooders from the wild for hatchery work. One was the cost per brooder going upto Rs.50,000. The other was the possibility of these brooders carrying white spot virus. Recalling that earlier eye stalk ablation to induce breeding was being done at the hatcheries, he said that because of the uncertainities in this regard, the dependence was now more on wild gravids. Further, as Nauplii Production Centres had now come up, he explained that , the hatcheries now depended on nauplii supplies from these centres. 7000 million PL were being produced now from 100,000 spawners. Of these, 25% was being produced through maturation (ablation) system and rest from gravids, it was clarified.

Swamy said that, coastal sector-wise, half of the wild broodstock was sourced from A.P., 20% from Orissa, 28% from Tamilnadu and 2% from Kerala. So far as nauplii production was concerned, it was explained that 60% was from A.P. centres, 25% from centres in Tamilnadu and 15% from Orissa.

A major point highlighted by Swamy was that the customs duty levied on Artemia cyst imports into India was the highest at 40%, compared to no levy at all in Bangladesh and Malaysia and 2-8% in other countries. He also spoke on bacterial (Luminous vibrio) and viral (white spot) diseases afflicting larval stages of shrimp and on the infrastructure developed to detect their presence and taking remedial steps. He said that 20 laboratories had been set up in various coastal states including in house labs at hatcheries. 29 hatcheries had already registered themselves with MPEDA for setting up such Labs (MPEDA gives a subsidy to the extent of Rs.500,000 for acquiring needed equipment).

Dealing with the main problems confronting hatchery sector, he said that this related to general non-availability of disease-free brooders and the problem could be resolved only by developing domesticated broodstocks. Cost of production could be brought down only when government reduced the customs duty on artemia to a minimal level. He exhorted that all hatcheries should implement the code of practices standardised by MPEDA.

It was pointed out that price of shrimp seed (PLs) varied from Rs.50,000 to Rs.550,000 per million. For rationalising the price structure, he suggested that production should be augmented by hatcheries, especially during off-season i.e., April and May and in September and October, while regulating the same during the busy season. Another aspect suggested was that, in order to tone up the on-going culture of tiger shrimp in freshwater ponds of 0-5 ppt, the intermediate nursery phase of seed before stocking should be strengthened by rearing them in nurseries for 7 to 10 days by gradual reduction of salinity to zero ppt. He said that effluent treatment plants should be established for treatment of hatchery effluent water before release into open waters. Another point made was that shrimp health centers should be set up at centralised locations to extend the needed services to check soil and water quality, seed/feed quality and for disease diagnosis. He also emphasised on the need to set up a planning group to look into future needs and formulate integrated plans for implementation.

SESSION IV

At this Session, presided over by Fishery Industry Officer, FAO, Ms.Helga Josupeit, Technological aspects of Production - Processing and Quality Assurance of Shrimps were considered.

White Shrimp Trade Potential: Helga Josupeit presented a paper on "A Overview of Global Shrimp Supply". She said that around 20% of International Trade in Fish and Fishery Products in value terms was that of Shrimp. It was mentioned that the shrimp market stayed stable over the past 20 years, despite substantial changes in supply of fishery products to the World market. The EU, USA and Japan were the World's major importers of shrimp. She said that in respect of these three importers, the total imports were of the order of 950,000 t in the year 2000 compared to 8,800 t in 1995. It was observed that, for many years, the USA had been the driving force behind shrimp trade, but the recent development pointed out to a drop in demand in that country. She explained the potential for further expansion in white shrimp trade, despite the slowing down in demand in main importing countries. She added that there had not been much of increase in

production from Indian and Atlantic Ocean Zones, although there was good growth in the Pacific Ocean area. It was mentioned that exports from Brazil and Mexico were growing and that US market was stronger than Japan in 1999.

Technical Innovations to promote culture shrimp yields: Tarlochan Singh of INFOFISH read a paper on "Technological Aspects of Sustainable Fish Farming". At the outset, he referred to steps taken to promote awareness among farmers through various initiatives such as FAO Code of Conduct of Responsible Fisheries, the outcome of the Bangkok Technical Consultation on policies for sustainable shrimp culture, the aquaculture sustainability action plan of ADB/NACA, the Holmenkollen guidelines for sustainable aquaculture and the Code of Practice for Sustainable Shrimp Farming prepared by the Global Aquaculture Alliance. He said that these initiatives addressed issues such as sensitive coastal eco systems, mangroves, site selection, design and construction of farms, feeds and feeding, health management of cultured organisms, use of drugs and chemicals, culture operations, effluent and solid waste management, etc.

Singh said that Shrimp farming industry in Asia had been making efforts to adopt sustainable and environment-friendly methodologies and technologies with significant progress. He mentioned that these efforts were aimed at conserving sensitive national eco-systems, prevention of disease, stemming or reducing pollution to the external environment, as well as maintaining good environmental conditions in the ponds and avoiding or mitigating conflicts with other resource users. It was pointed out that some of the recent and not so recent developments included the use of probiotics, polymerase chain reaction PCR screening of spawners and post-larvae, stress tests for postlarvae and use of water storage reservoirs for shrimp ponds, a trend towards water recirculation and zero discharge from shrimp growout ponds, strategies to reduce sludge build up in ponds, treatment of discharge water, and integration of fish with shrimp culture.

Tarlochan Singh gave a vivid description of all these technical innovations adopted by shrimp farmers in some of the Asian Countries and recommended that these could be adopted by others as well in order to make shrimp farming more sustainable and environmentally friendly.

Way to Safe Products: Mike Dillon presented a paper entitled "Traceability and Risk Assessment in the Shrimp Industry", authored by him along with G. Nanyaro, E.J.Mosha and M. Thompson. Providing real-case scenarios, the author narrated instances related to the food sector and spoke on the manner in which certain recommendations could be applied to prevent such instances in the shrimp sector. He said that application of these recommendations would facilitate effective product crisis managemeent. It was pointed out that monitoring for compliance with regulatory standards was essential so as to prevent health risks for consumer production and for facilitating trade.

It was pointed out that production of safe products was the responsibility of the processors, the primary producers, inspectors, feed and raw material suppliers and distributors. He said that, in order to establish integral control, there should be regular cooperation among those in the production chain for the development and implementation of valid codes of practice. He said there was a worldwide movement to stick to proven standards in respect of drug utilisation, food control, water quality, end-product handling, etc.

It was mentioned by Mike Dillon that the supply chain of the developing countries, fed on expanding global market, provided objective evidence of control. He said that in Africa, the concerns related to safety and quality of shrimp were being currently addressed. The artisanal and vessel supply chains were being reviewed so as to ensure improved traceability of the product. He made several recommendations for ensuring supplies of quality products.

Speaking on risk analysis Dillon said that companies concerned should collect information in this regard on (a) pathogens which should be considered, (b) statistics of pathogens associated with their products, and (c) severity of infection by these pathogens. Availability of information on these lines would lead to positive results out of risk assessment and traceability studies. Standard protcols for undertaking risk studies should be formulated and the first step in this regard was to establish a steering group set up by a competent authority.

Emphasising the need for brand protection,Dillon pleaded for global policy for setting up of binding incident management teams, creating audit tools for sectoral control for verifying traceability system and for implementing risk assessment procedures.

Concluding his presentation, he said that production should be based on principle and code of practice (including procedures for risk)monitored by HACCP system so as to ensure nature, origin, and full traceability through the supply chain.

Farm/Hatchery Certification through Accreditation System: Celia R. Lavilla Pitago of SEAFDEC spoke on Disease Management in Shrimp Farming. Describing the current shrimp culture practices, she pointed out that the disease problem arose from utilisation of broodstock collected from the wild by hatchery operators. It was observed that there was a change in the dominant shrimp species composition in natural stocks because of fishing pressure. Broodstock supplies from the wild were also dwindling, it was mentioned. Discards and escaped ones from hatcheries and farms tended to affect the genetic integrity and health of natural populations. Pointing out that there was no disease and genetic control in the selection of brooders, she pleaded for adoption of a code of practices to solve disease problem at hatchery and growout stages and for ensuring sustainable shrimp farming. The introduction of farm/hatchery certification system by recognised agencies through an accreditation procedure was suggested for prevention of disease incidence. There had to be a system of post-larval quality assurance based on age. She said post larval testing before stocking would be use-

ful. Mentioning the significant viral diseases (WSSV, YHV, TSV, IHHNV, HPV), she pleaded for examination of samples of brooders and other grown specimens through microscopy, microbial isolation, histopathology, etc. Adoption of control strategies for viruses of improved husbandry through stocking of specific pathogen Free (SPF) or Specific Pathogen Resistant (SPR) post larvae was suggested. It was pointed out that the practice of using domesticated broodstock at hatcheries should be adopted in the place of wild brooders. She added, sensitive diagnostic tools should be used for disease detection. Live shrimp or frozen shrimp products should be kept away from brooder shrimp centres. Use of frozen shrimps for reprocessing might also lead to spread of virus, she said.

Celia mentioned that care should be excercised in raising domesticated shrimp stock too and selective breeding had to be undertaken with domesticated stocks. It was observed that in domesticated specimens fecundity was up and durations of life cycle stages had been noticed to be down. Mentioning that domesticated ones provided reliable stocks which were ideal for farming, she advised that selection of broodstock out of domesticated ones would have to be based on growth preformance, feed conversion ratio and survival rate.

The factors that excercised negative effects on shrimp farming were listed by her as follows: 1) Use of canal water, and not sea water directly, as source of feeding ponds, 2) presence of a number of farms within 3 km. 3) several farms receiving water supply from the same source, 4) several farms discharging effluents into the source of water supply, 5) flushing as a method of silt removal, 6) inadequate aeration and 7) absence of any form of screening. It was pointed out that optimal dissolved oxygen content in a shrimp culture pond was 5 parts per million.

It was observed that international shrimp market was getting more and more sensitive to wholesomeness and that there was tremendous pressure on developed countries to ban imports of shrimp from countries practising environmentally damaging practices. As one of the approaches to reduce disease problems in shrimp farms, Celia suggested lower levels of stocking densities, creation of buffer zones, and adoption of an integrated system for effluent treatment. Isolated farms were conducive for environmental upkeep, it was pointed out. Pond water recirculation system, sterlisation of pond environment through use of antibiotics, genetic selection for ensuring disease resistence were advocated. It was explained environmental friendliness promoted growth and survival of shrimp.

Eco-labeling: Tarlochan Singh presented on behalf of Oluyemisi Olorutuyi and Duncan Leadbitter, the authors of the paper entitled 'Seafood Ecolabeling for a Sustainable Shrimp Industry'. The growing consumer awareness of environmental issues and a desire to identify the products administered to have been produced in a manner consistent with good environmental practices, had led to a demand for products whose extraction, production and/or utilisation could be identified as having less impact on the environment, it was pointed out. The result was that eco-labeling was featured as the main mechanism for harnessing the benefits arising out of this development. The author said that sea food eco-labeling provided an excellent opportunity for stakeholders to demonstrate their commitment to a sustainable industry and receive recognition for such efforts. It had provided an avenue for access to new markets. In the wake of the concern of stakeholders on the subject and their interest in the potential for a seafood ecolabeling programme the Marine Stewardship Council (MSC) was set up to implement an International Fisheries Eco-labeling Programme. This Council had already certified five fishery Enterprises and another 24 others were at various stages of certification. It was pointed out that the MSC had experienced significant success since its inception as demonstrated by growing retailer and consumer support with certified products placed for sale in valuable seafood markets around the world. It was mentioned that shrimp was an important International commodity which had generated various responses from consumers around the world and the prospect of ecolabeling of shrimps was found to have potential to result in providing certified protection from environment, to help business and other stakeholders involved in the industry.

Vitamin C Needs: Brian Hunter, of Roche Aquaculture Centre, Asia-Pacific, Bangkok, Thailand spoke on the physiological role of dietary vitamin C in penaeid shrimp. He mentioned that vitamin C was required for proper collagen formation and wound repair in shrimp. Severe deficiency could result in "Black Death" syndrome, characterized by black melanized lesions. He added that the vitamin C requirement for shrimp was originally overestimated due to use of crystalline form of vitamin C, which was susceptible to high losses due to feed processing, storage, and leaching. The estimated requirement using stable phosphorylated forms ranged from 40 to 430 ppm for various species and life stages. Elevated dietary levels of vitamin C had been shown to improve resistance to disease, salinity shock, and other stresses. Hunter also spoke on the beneficial uses of Astaxanthin as an ingredient of shrimp feed for promoting natural pigmentation of tiger and other shrimps.

Importance of Nursery Phase: Edgardo P Reyes of Philippines spoke on "Practical Approaches to Modern Shrimp Hatchery Management". Reyes mentioned that shrimp hatcheries which had a modest beginning had now developed into very efficient systems governed by proper management procedures. Now spawning and hatching were done in separate tanks and a predetermined number of nauplii were stocked in larval rearing tanks. The modern commercial shrimp hatcheries now operated with added facilities like broodstock maturation tanks and nursery systems. These tanks became necessary as supply of spawners from the sea had been diminishing. It was mentioned by him that a transitional period in the nursery system to allow the hatchery bred fry to adopt to the natural environment had been integrated into

hatchery operations. It was also pointed out that the maturation technique was improved further but the nursery was found to be more efficient for raising post-larvae as part of the farm system rather than of the hatchery.

The author added that because of increasing pressure to make the hatchery bred- fry to meet the quality criteria of the grow-out center, more sophistication was incorporated into the hatchery system. This consisted of improved water filtration and storage facilities, disinfection system and production protocols. It was mentioned that in most of the present day shrimp hatcheries, the quality of fry was examined before supply to the farmers.

Pointing out that selection of site for location of shrimp hatchery was dependent on several factors, one of which was the level of investment needed, he said that the expertise that was needed to run a shrimp hatchery was related to the profits that it could generate.

Concluding, the author said that present day shrimp hatchery system had more control points. The degree of specialisation in natural food production, maturation, water treatment, disease prevention and control and in other production related activities was as intensive as in larval rearing systems.

Processing Equipments: A paper entitled "Recent Development in Processing and Packaging of Value-added Shrimp Products" authored by Hinrik Ziegler of Dantech Food Systems,Singapore, was presented by Jose Martin Xavier. It was mentioned that the company specialised in the production of processing equipment for the shrimp industry in tune with the present day requirements involving conformity with EU and US and other regulations. They manufactured spiral freezers, IQF single built and double built tunnels, vibrating glazers, vibrating feeders, hardening tunnels, insulated plastic tubes, mechanical glazers, computarised weight grading systems and high performing Refrigeration systems. He said that crushed block ice had replaced flake ice for use in the preservation of shrimps etc. Referring to the future, it was mentioned that one flexible machine to take care of small sized, raw or cooked products / medium size raw or cooked products, head-on products of all sizes and tray packers was being developed. Spiral freezers with capacity of 250 kg/h and upwards and double belt IQF tunner freezers 250 kg/h and upwards were also being manufactured.

Panel Discussion

In the ensuing panel discussion, Azam of Khulna University of Bangladesh sought a clarification from Mike Dillon whether traceability went hand in hand with HACCP system. In reply it was clarified that the Shrimp network map took care this aspect. He told Tarlochan Singh that species other than Tilapia were also amenable for traceability. Answering another query it was clarified by Celia R Lavilla-Pitago that live animals passed on disease most effectively to others. It was also mentioned that while frozen material also eventually transferred diseases, that was not a major issue. She also clarified a few points raised by Sudarshan Swamy. One point raised was that broodstock fecundity of wild broodstock had been going down for the past five to six years not only for gravids but also for mature females subjected to ripening process at the hatcheries. The reply given was that the growth rates of shrimp were very high some years back. Reason for the decline in fecundity could be that shrimps were probably reaching broodstock stage at an younger age. To the point that in Western Australia the domestication of shrimps was being preferred to wild catches, it was mentioned that domestication became an industrial need. Collection from the wild meant chasing of mothers which was an arduous task. It was also mentioned that domestication had also certain problems of fecundity, etc. Oceanic Institute of Hawaii produced SPF Shrimp Broodstock for the first time which was a breakthrough. She also mentioned that in Thailand, a consortium was engaged in shrimp domestication work. It was expected that Thailand would be ready with a good stock of domesticated shrimp soon and might also be in a position to share technology with others. To a point raised by J.Bojan that vibrios constituted a micro biological hazard and there was need to solve this problem, Tarlochan Singh said that one solution for this was to have buffer zones. L.Palhe de Sousa of Mozambique made an observation that frozen shrimps were perceived to be harmless but it was not correct as there was now evidence that, they could also transmit diseases through portions rejected and thrown out, to prepare them for cooking.

Closing Session

Subasinghe, summarised the presentations at the various sessions.

As mentioned by him, one point that emerged was that the claims by environmental groups that shrimp culture was harmful was belied by experiences as narrated by Chamberlain of Global Aquaculture Alliance. One of this was the experiences of Belize Farm in Central America where intensive shrimp culture systems were being practised without any harm to the environment. The Conference also noted, he said, the degree of efficiency of TEDs. The Conference also emphasised the need for transparancy of field developments and also the need for technological upgradation of the various culture practices consistent with environmental safety. The Conference was greatly impressed by the presentation made in respect of developments in the Thai fishing Industry by Paiboon Ponsuwanna. The presentation made by Jose Cyriac and Elias Sait on Shrimp production and handling, processing and export aspects were very informative, he said. It was mentioned that the delegates felt depressed at the gloomy picture of the shrimp market situation presented by Helga Josupeit and Katushiko Shimizu. They were however heartened to know that a recovery was round the corner, he added. He made a particular mention of the encouraging results in respect of organic shrimp production in Vietnam and hoped that this kind of culture system would have a spread affect. It was refreshing to note that there was a sudden transition from frozen foods to readymade meals which fetched a better price and at the same time was convenient to the consumers, he said in conclusion.

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UltraSil-Aqua: This is a speciality Zeolite formulation for exclusive use in aquaculture ponds and is specially recommended as a water quality improver in Shrimp, Prawn and Fish ponds to prevent occurance of diseases and helps faster growth and higher profits.

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GasoRid-FS Aqua: This is a natural solution that controls emissions of Ammonia, Hydrogen Sulphide and other noxious gases in aquaculture ponds. It contains selected glyco components from plant *Yucca schidigera*, Microencapsulated enzymes and *Bacillus subtulis*. Sarsaponin, one of the steroid compounds in the extract of the *Yucca sachidigera* plant, reduces free ammonia levels.

DISEASE CONTROL

FunzoNex Aqua: This is a proven combination of Malachite Green and Formalin for use in treatment of ectoparasitic infections of fish, particularly the protozoa - *Costia* (Ichthyobodo), *Trichodina* and *chilodonella* - in fish ponds and is also effective against monogenetic skin and gill flukes such as *Dactylogyrus* and *Gyrodactylus*.

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Physiological Role of Dietary Vitamin C in Penaeid Shrimp

Brian Hunter
Manager, Roche Aquaculture Centre Asia Pacific, Rovithai, Ltd.
11/F, 2535 Sukhumvit Rd., Bangkok 10250, Thailand

Penaeid Shrimp including important commercially cultured species such as tiger shrimp (*Penaeus monodon*), white shrimp (*Litopenaeus vannamei*), blue shrimp (*L.stylirostris*) and kuruma prawn (*Marsupenaeus japonicus*) require dietary vitamin C for maximum growth and survival. Guary *et al.*, 1976 were the first to observe that vitamin C was required for maximum growth in penaeid shrimp. In 1977 and 1979, a vitamin C deficiency disease of penaeid shrimp was described (Lightner *et al.*, 1977: Magarelli *et al.*, 1979).

Deficiency Symptoms

Vitamin C deficiency disease (often called Black Death), is characterized by black melanized lesions of the loose connective tissues of the body, especially under the carapace, the abdomen, the gills, and in the foregut and hindgut. Gross lesions may show a series of black bands at the articulations of the abdominal segments, giving the affected animal a striped appearance (Figure 1).

Histological examination reveals multiple melanized lesions composed of haemocytes and associated with inflammatory cells (Figure 2). In experimentally induced vitamin C deficiency, shrimp with disease signs and mortalities occur starting in weeks 3-5. Daily mortalities in a deficient population may reach 1-3% per day, and some but not all mortalities will display Black Death signs. Once an animal shows Black Death signs, cessation of feeding and death invariably occur within 24h-72h. Without addition of dietary vitamin C, mortalities may approach 100%. However, if vitamin C is added to the diet of the deficient population, the disease and resulting mortalities may be arrested.

Physiology

In 1979, Hunter *et al.* were able to show that shrimp, like other vertebrates, require vitamin C for proline hydroxylation of collagen. In growing shrimp without access to vitamin C, the collagen support structure of the shrimp is not properly formed, which leads to the disease signs previously described. Hunter (1979), and Lightner *et al.* (1979), showed that dietary vitamin C was also required for wound repair of penaeid shrimp, another role of structurally sound collagen formed by shrimp with adequate vitamin C supply (Figures 3 and 4).

Table 1. Vitamin C effect on survival of shrimp following stresses.

Species	Size	Challenged	Vitamin C Type and Level*	Survival
M. japonicus	Not stated	Injected *Vibrio* sp.	0 ppm AP	14%
			50 ppm AP	80%
L. vannamei	Post-larvae	V.*harveyi* epizootic	0 ppm AP	27.5%
			20 ppm AP	34.4%
			40 ppm AP	37.5%
			100 ppm AP	37.5%
			2000 ppm AP	95.8%
P. monodon	4-5 g	Salinity Drop to 0ppt	0 ppm AP	33.3%
			53 ppm AP	53.6%
			189 ppm AP	73.3%
L. vannamei	Post-larvae	Salinity Drop to 0ppt	0 ppm AP	32.5%
			20 ppm AP	32.5%
			40 ppm AP	62.5%
			100 ppm AP	62.5%
			2000 ppm AP	90.0%
P. monodon	Post-larvae	Salinity Drop to 0ppt	0,20, or 40 ppm AP	25-30%
			200 or 2000 ppm AP	75%
P. monodon	Post-larvae	Salinity Drop to 0ppt	100 ppm AP	16.7%
			1700 ppm AP	43.7%
			3400 ppm AP	61.7%
P. monodon (Cold Adapted)	2-10 g	Temperature Increase to 32° C	0 ppm AP	46%
			30 ppm AP	71%
			60 ppm AP	67%
			100 ppm AP	67%
P.Californiensis	0.7 g	Experimental Wounding	0 ppm AA	73%
			2000 ppm AA	92%
L.Stylirostris	0.07 g	Experimental Wounding	0 ppm AA	76%
			2000 ppm AA	87%

*AA = ascorbic acid, AP = Various ascorbyl phosphates

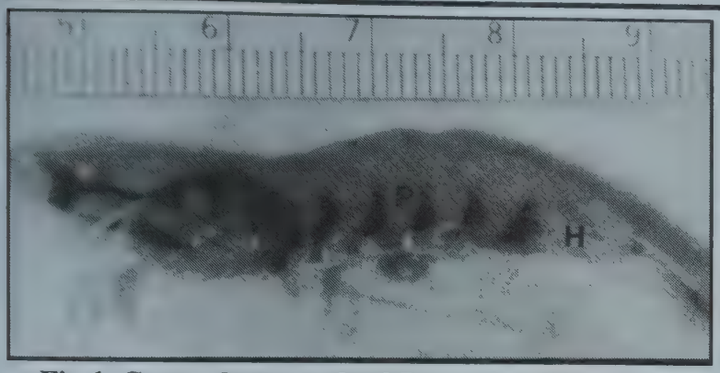

Fig 1. Gross photograph of *Penaeus californiensis* with vitamin C deficiency disease, showing extensive melanization of the branchial cavity (B) tissues underlying the articulations of the abdominal segments (P), and the hindgut (H).

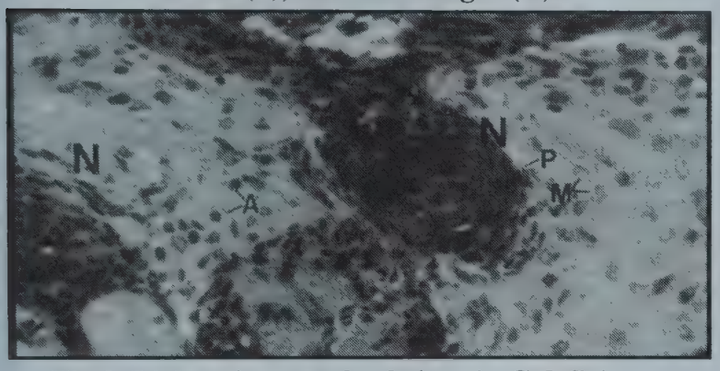

Fig 2. Light micrograph of vitamin C deficiency disease lesion in *Penaeus stylirostris*, showing melanized nodules (N) of flattened haemocytes and inflammatory cells (A and M).

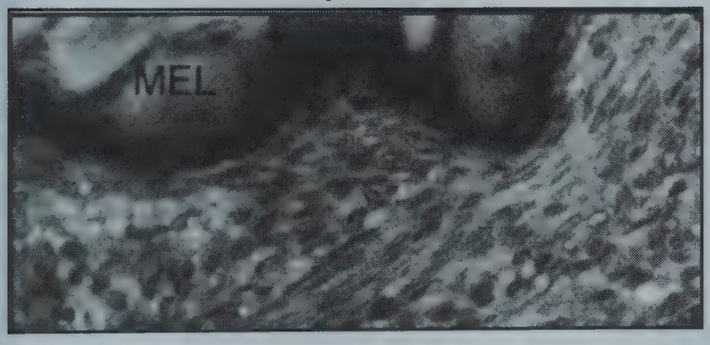

Fig 3. Vitamin C-deficient *Penaeus californiensis*, 15 days post-wounding showing massive melanized wound plug (MEL) surrounded by extensive granuloma tissue.

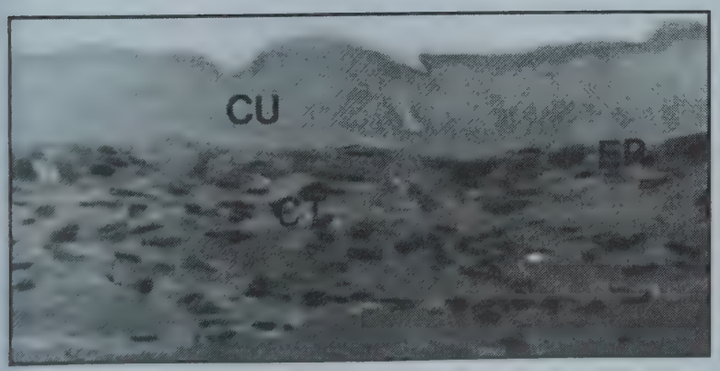

Fig 4. Vitamin C - supplemented *Penaeus californiensis*, 15 days post-wounding showing new epithelia (EP), new cuticle (CU), and a thin fibrous connective tissue layer.

Quantitative Requirement

Early researchers studying shrimp vitamin C concluded that the requirement was as high as 3,000 - 10,000 PPM. These studies were conducted using crystalline vitamin C (ascorbic acid), and much of this form was destroyed by pelleting or leached from the diet prior to consumption. Estimates of minimum vitamin C requirements for penaeid shrimp determined using stable phosphorylated form are much lower, due to the stability of ascorbyl phosphates to oxidation and to their limited water solubility. Estimates for ascorbyl phosphate requirements in penaeid shrimp have ranged from 40 to 430 ppm (Shigueno and Itoh, 1888; He and Lawrence, 1993; Shiau and Hsu, 1994).

Benefits of Elevated Doses

Other nutritional research has shown that vitamin C serves a protective role against disease and physiological stress at dietary inclusion levels which are often higher than the levels established for growth requirement. Table 1 summarizes the effect of dietary vitamin C on survival of penaeid shrimp subjected to physiological and pathogenic challenges in lab trials.

Takahashi *et al.* (1989) found that 200 ppm AP resulted in increased survival of *M.japonicus* following an injection of pathogenic *Vibrio* compared to a no-vitamin-C control. They also reported impaired phagocytosis in vitamin-C-deficient *M.japonicus*. Kanazawa (1995) also found an improvement in survival of *M.japonicus* fed on AP following injected *Vibrio* challenge compared to non-supplemented shrimp. Merchie *et al.* (1995) found that dietary AP enhanced survival of *L.vannamei* during a natural epizootic of *Vibrio harveyi*. Supplementation to shrimp diets with 20ppm to 100 ppm AP enhanced survival compared to a no-vitamin-C control. Survival was much higher for shrimp receiving 2000 ppm of AP.

At least four studies have shown that dietary vitamin C affects survival of shrimp following osmolarity stress, a common occurance in shrimp ponds after heavy rain. Merchie *et al.* (1995a), found *L.vannamei* post-larvae fed on 0 or 20 ppm of AP had lower survival than those fed on 40 or 100 ppm of AP following instantaneous salinity drop to 0 ppt. The highest survival was achieved when shrimp were fed on 2,000 ppm of AP. In a similar osmolarity study, Merchie *et al.* (1995b) found *P.monodon* post-larvae survival higher for treatments receiving 200 ppm AP or 2000 ppm AP than for those receiving 0,20, or 40 ppm AP.

A second confirmatory trial documented the effect of vitamin C on survial of *P.monodon* post-larvae subjected to 0 ppt salinity (*Merchie et al.*, 1996). Survival was the highest for shrimp receiving 3,400 or 1,700 ppm AP, compared to shrimp receiving 100 ppm AP. A relation between dietary vitamin C intake and survival of juvenile *P. monodon* following osmolarity stress was also found (Hunter *et al.*, 1998). Survival was the greatest for shrimp receiving 189 ppm AP, intermediate for shrimp receiving 53 ppm AP, and the lowest for shrimp receiving 53 ppm AP, and the lowest for shrimp receiving no vitamin C following gradual salinity reduction to 0 ppt.

Survival of penaeid shrimp following temperature stress or experimental wound

healing was also improved following dietary vitamin C supplementation. Machigashira *et al.*(1991) found that cold-adapted *P.monodon* survival following temperature increase to 32° was higher for treatments receiving 30, 60, or 90 ppm AP compared to the no-vitamin-C treatment. Hunter (1979) and Lightner *et al.* (1979) found that survival of *P.californiensis* juveniles and *L. stylirostris juveniles* were higher following experimental wounding for shrimp fed on a diet with 2,000 ppm added AA compared to shrimp fed on a diet without added AA.

Conclusions

Vitamin C is required by shrimp for proper collagen formation and wound repair. Severe deficiency can result in "Black Death" syndrome, which is characterized by black melanized lesions. The vitamin C requirement for shrimp was originally overestimated due to use of crystalline forms of vitamin C, which are susceptible to high losses due to feed processing, storage, and leaching. The estimated requirement using stable phosphorylated forms range from 40 to 430 ppm for various species and life stages. Elevated dietary levels of vitamin C have been shown to improve resistance to disease, salinity shock, and other stresses. (Cited references may be requested from the author).

(*Courtesy : **Global Aquaculture Advocate*** (Vol.3 issue 2, pages 29-30).

Impact of WTO provisions on Fisheries Sector

A Conference was held in Visakhapatnam on 12th September, 2001 under the Chairmanship of Mr. D.S. Murthy, Commissioner of Fisheries on the captioned subject. A large number of representatives of fisheries associations, scientists and other officials participated. During the discussions, views were expressed that while imports of fishing vessels could be allowed, there would be need to stipulate certain safeguards to protect the interests of small scale fishermen. Regarding exports, there was an unanimous agreement that sea food exports needed to be optimised but this would be possible only when the production base was expanded and post harvest facilities strengthened particularly in respect of value addition. The area under shrimp culture also could be expanded progressively linked to a mechanism of supply of seed from the hatcheries along the coast to the interior. D.S.Murthy, Commissioner of Fisheries, emphasised that maintenance of quality was important at all stages, i.e., during fishing operations, storage in fishing vessels and post-harvest operations. Harbours and fish markets would have to be maintained in hygienic conditions.

The Commissioner pointed out that the share of A.P. in the overall marine product exports was substantial. Out of Rs.6400 crores of marine products exports earnings annually at national level, Rs.2600 crores were being contributed by A.P. He warned that unless hygienic standards at all stages related to sea food exports were upgraded in the country, other countries such as Vietnam, Indonesia and Srilanka would overtake India. It was mentioned by him that only 40% of the recognised exporters were at present able to conform to global standards of hygiene in respect of marine products exports. Steps were necessary to ensure that the others too also fell in line. In order to accelerate this process, he said that a cell had been set up by the State Government with Secretary for Agriculture as Chairman and Commissioners of Fisheries, Animal Husbandry and Sericulture as members, besides three representatives each of seafood exporters, scientific experts and farmers. He explained that the Cell would help the sector by providing information on market conditions, prices of different exportable commodities and quality standards required by importing countries. The cell would also extend guidance to sea food exporters.

The Commissioner emphasised the need to extend the available road network to the coastal areas not yet served by roads to ensure faster and smoother transport from inaccessible landing centres to end-users. The need for setting up of adequate ice plants and cold storages at various central places was also emphasized by him.

Among the various recommendations made at the conference were: Recognition to aquaculture as a priority item in all water bodies on par with agriculture by extending important services like water and power supply and liberal terms of credit; a campaign to create awareness among shrimp farmers to get their aquaculture activities regulated by the Aquaculture Authority of India; diversification into exploitation of species like freshwater prawn, crab, seabass, mullet etc.; insurance coverage; promoting the setting up and use of fish drying platforms, and upgradation of post-harvest technology.

On the safety of fishermen venturing into the sea, the Commissioner said that his department had established 12 shore stations which communicated with the fishermen out at sea through very high frequency sets having a range upto 80 km. These VHF sets were being supplied to fishermen with a subsidy component of 50 per cent.

Another safety measure was the supply of inflatable life rafts at 50 per cent subsidy to boat. He said that life boats designed by the FAO of the UN, could be simultaneously used by a crew of seven. Already 300 boat owners in Visakhapatnam and 100 of them in Kakinada had purchased these, he said.

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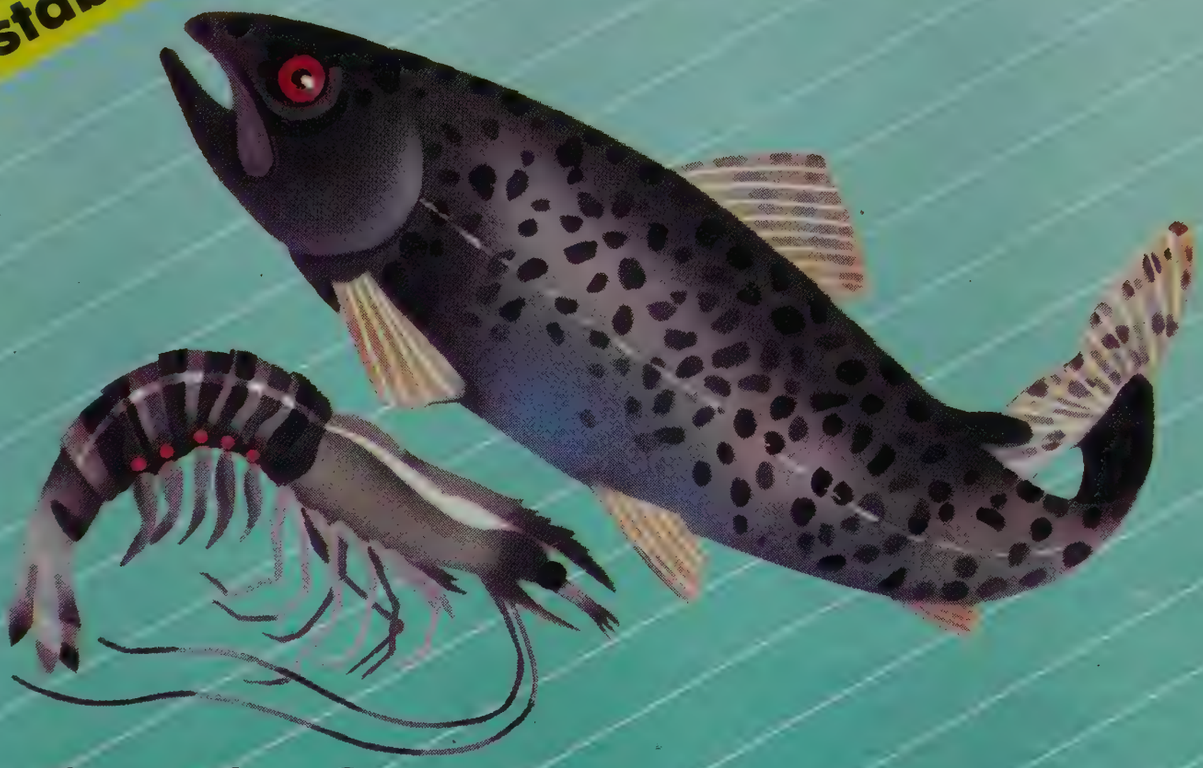

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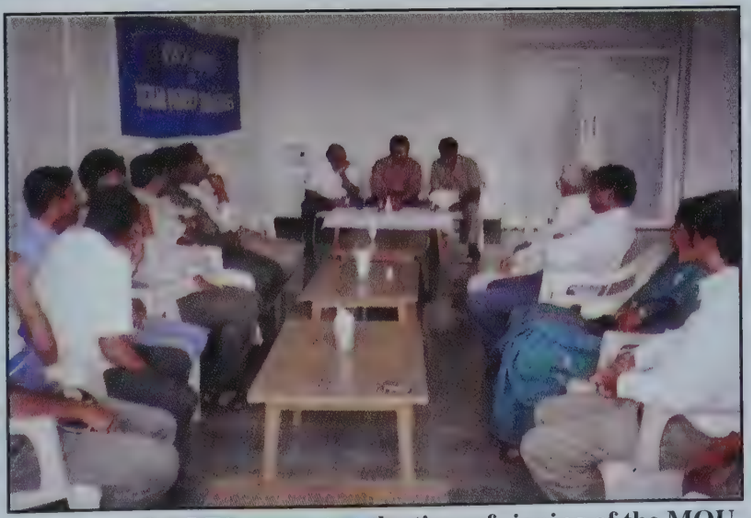
Tuna Pilot Project : MOU

Readers will recall that the Pilot Tuna Project for equipping two private sector shrimp trawlers with tuna longlining equipment and for similarly equipping one or two trawlers of the Fishery Survey of India and one trawler of integrated fisheries project was approved. As a follow up, the Ministry of Commerce authorised MPEDA to provide 50% subsidy on the cost of the equipment for installation on two private sector shrimp trawlers and also for providing 25% subsidy on cost of engaging foreign experts for installation of equipment and for providing training to crew in respect of monofil longlining operations.

Dr. G. Santhankrishnan, Secretary, MPEDA signing the MOU. Sitting next to him are Mr. T. Raghunath Reddy, President, AIFI, and Mr. B. Srinivasa Rao, Managing Director, SBS Marines Ltd and Secretary, AIFI one of the other signitaries to the MOU.

Mr. Y. Surya Rao, President, Seafood Exporters Assn, Visakha region and Excutive Council member, AIFI, presenting a token gift to Dr. G. Santhankrishna.



Members of A.I.F.I present at the time of signing of the MOU.

As a further follow up, on 1st October 2001, a Memorandum of Understanding among MPEDA and the Association of the Indian Fishery Industries and the beneficiary companies was signed. The beneficiary companies are M/s. Sagarika Seacraft Limited and M/s. S.B.S. Marine Limited. Dr.G. Santhanakrishnan, Secretary, MPEDA signed the MOU on behalf of MPEDA and Mr. T. Raghunath Reddy, President of AIFI signed on behalf of the Association. Mr. B. Srinivasa Rao and Mr. Ramesh signed on behalf of S.B.S. Marine Limited and Sagarika Seacraft respectively.

Speaking on the occasion, Mr. T. Raghunath Reddy expressed happiness that the MoU was signed. He mentioned that the Japanese company, who would be supplying the equipment and installing the same on the trawlers, had confirmed their willingness to go ahead with the project. It was also mentioned by him that the Japanese Company was requested to adopt the same price structure as in the initial quotation given quite sometime back, and hoped that it would agree to this. He also mentioned that the Japanese company had already taken up schemes for equipping the indigenous vessels one each of Lakshadweep and Maldives for the installation of tuna longlining equipment. He hoped that in about 3 to 4 months the installation of tuna longlining equipment on the two Indian trawlers would be completed.

Dr.G. Santhanakrishnan, Secretary, MPEDA congratulated Mr.T. Raghunath Reddy, President, of the Association of Indian Fishery Industries for the co-operation extended in respect of the pilot project. He described the signing of the MoU as a landmark development. It was also mentioned by him that the idea of taking up a pilot project for equipping shrimp trawlers with longlining equipment was conceived a few years back and he was happy that the project was now in the last lap before taking off.

The Secretary observed that only tuna in Indian waters was allowed to die a natural death. Only around 34,000 tonnes of them were being caught annually against the resource potential of over 300,000 tonnes. It was unfortunate that, although India was the member of IOTC, the resource could not

be exploited by the Indian Industry. He said that MPEDA supported the pilot project as a prelude to large scale conversion of existing trawlers for tuna longlining as well. It was also mentioned by him that the companies which took up tuna longlining earlier could not succeed because of deficiencies in fishing system, high cost of operations etc. He recalled that monofilament longlining system was proposed to be adopted, based on the recommendations of an FAO expert, sometime years back. He reiterated that MPEDA was in readness to shoulder the challenge. He complimented AIFI for identifying two enterprises for equipping their trawlers with longlining equipment as well and said that these two would be able to catch 300 tonnes of tuna each per annum to fetch a minimum of US$ 5000 per tonne.

He predicted that, in another 5 years, India would become one of the leading tuna fishing countries, adding another Rs. 400 to 500 crores in foreign exchange through their export .

Fishing Chimes in FAO Library, Rome

Fishing Chimes is often consulted at FAO's Library in Rome. In these pictures taken at the Library may be seen (L to R) Dr. Uwe Tiuetze, Dr. Erhard Ruckes, and Dr. Erhard Ruckes, Fishery Industry Officers, FAO, and Ms. Judy Allan, FAO's Librarian.

'Sai Sadhoba', 23 m LoA Trawler launched

Mr. A.K. Pattnaik, Secretary, Food Processing & Sunderban Affairs, Government of West Bengal, launched deepsea fishing trawler "Sai Sadhoba" at the Man of War Jetty, Kolkata on 27th September, 2001. Guests of honour at the function were Mr. Mitsuo Honda, General Manager, Mitsubishi Corporation, Kolkata and Mr. Kai Marthinsen, Managing Director, Bemar a.s. Norway. The event was very well attended.

Sadhoba Marine Pvt. Ltd. is part of Sadhoba group of companies. This company was founded by Capt. Haren Mahapatra, a sea-farer and an NRI, and who is the Managing Director of the company. His dynamism has ensured speedy growth of this company, which also manufactures fishing nets and gears of world standards mainly for exports under a joint venture with Safa Marine Industries Ltd., Bhubaneswar and Refa Co. of Norway.

Safa Marine Industries Ltd., Bhubaneswar, was inaugurated on 11th February, 1997, by the Chief Minister of Orissa, in the presence of the Ambassador of Norway of India. Since then, it has been exporting all types of fishing nets to Norway and to other developed countries regularly. The factory of Safa Marine Industries Limited is located at Balasore in Orissa and this was the first commercial project to be financed by NORAD and the first project to export nylon monofilament nets from India. The Safa Marine Industries Ltd., has plans to diversify into all related areas and be a model world class industry. Other companies in Sadhoba group are a) Sadhoba Stars Pvt. Ltd., Bhubaneswar, b) Sadhoba Swarna Investment Pvt. Ltd., Bhubaneswar, and c) Sadhoba Saudagar Fishing Implements Pvt. Ltd., Bhubaneswar.

Fishing by Gujarat Boats in Maharashtra Waters

Mumbai High Court's Directive

The Mumbai High Court has directed the Fisheries Department of the Maharashtra Government on September 5 to consider on merit the renewal of licences for Gujarat fishermen to carry out fishing activities in the Arabian sea off Maharashtra coast and to give a reasoned order if their applications are rejected. Justices Hemant Gokhale and Vijaya Tahilramani also directed the licensing authority to allow such fishermen to carry out fishing activity in Maharashtra waters until a decision was taken on renewal of licenses.

The judges were hearing a petition filed by the New Fish Jetty Trawlers Owners Association.

Deepsea Prawn and Lobster Trawling on the Continental Slope of the SW Coast of India by 15m (50 ft.) LOA Vessel

C.P. Verghese and A. Ravichandran
Central Institute of Fisheries Nautical and Engineering Training
Cochin-682016

Jossy Palliparambil
Green Seas, Centre of Fisheries Study and Manpower Developoment, Palliport
Munambam 683515

Deepsea fishing hitherto had been attempted mainly by large vessels (vessels of 20 m.·LOA and above) for exploiting deepsea lobster and deepsea prawn in the deepsea zone off west coast of India including Wadge bank (Oommen, 1985). According to the experience so far gained, the minimum size of the vessel for deepsea lobster and deepsea prawn trawling in the continental slope has been 20m LOA. having 200 BHP engine. The operation of larger vessels over a period of time, in the context of increasing fuel cost, had become economically not profitable for exploitation of deepsea fish resources. Therefore, it has become necessary to undertake deepsea fishery exploitation with a high degree of economic management operating economically viable optimum sized vessels, deploying specially trained crew and fishing nets with diversified operation for fish and high value resources (Verghese, 2001).

In this context, some of the medium sized vessels of 50 to 60 feet LOA have ventured into deepsea for fishing deepsea lobster and deepsea prawn in the continental slope in the south-west coast of India. Because of satisfactory financial performance, many such vessels have started venturing from the Kerala coast for deepsea lobster and deep sea prawn. There are at present about 500 numbers of 50-60 feet vessels, of both wooden and steel construction, operating from Munambam/ Cochin, India, for deepsea fishing in the continental slope and for cuttle fish in the continental shelf all along from Wadge bank to Karwar coast. The success story of these operations is naurated in this paper.

Craft

The vessel used for the study is a 50 feet (15 m. LOA) stern trawler powered with 93 hp Leyland engine with turbo charger, converted for trawling in the continental shelf and slope zone. The profile of the vessel is given in Figure 1. The wheel house is provided with echo sounder capable of receiving signals from depths up

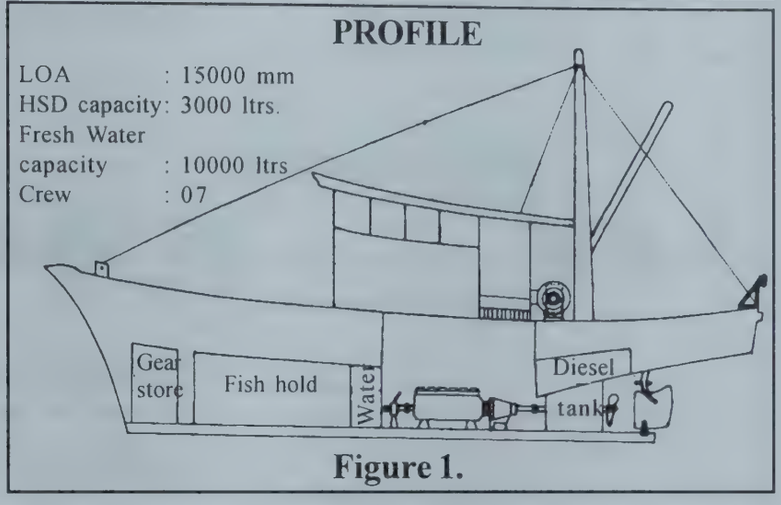


Figure 1.

1000 m, GPS navigator, mariners compass and radio receiver. The crew operate a mobile telephone upto a distance having a depth of 18 fathoms from the shore when they come for anchoring at night during turbulent weather. The engine power and the winch capacity for hauling the trawl are two important aspects which determine the success of deepsea fishing operation. Therefore certain modifications have been made in these equipments.

Main Engine Specifications

Make	:	Ashok Leyland
Type	:	HAV 411/18
SN.HM	:	36150 CMO-623
HP	:	93
RPM	:	1500

Gear box reduction ratio : 3:1

The engine has 6 cylinders, inline, vertical, turbo charged, freshwater cooled. No change has been made in the main engine.

Power Transmission System for Winch

a) *Before modification*: The power transmission for winch operation is taken from free end side of the engine through the arrangement called P.T.O.(Power take off) clutch, via pulleys and 'V' belts. One end of the clutch is coupled to the free end side of the engine crankshaft by a flexible coupling. The other end of the P.T.O. clutch is connected to the winch drive shaft directly via 'V' pulleys and 'V' belt. The P.T.O. clutch can be engaged and disengaged accordingly by a hand operated lever as required for the winch operation. There are only 2 'V' pulleys fitted in the power transmission system, one on P.T.O. clutch shaft having 200 mm diameter and another on winch drive shaft having 400 mm diameter. These pulleys are connected by one set (3 Nos.) of 'V' belts. The winch drive shaft is supported by 2 plummer blocks which are mounted on the extended frame of the vessel structure (Figure 2). The speed reduction (from 1500 to 750 rpm) ratio achieved by this pulley arrangement is 2:1.

b) *After modification*: The old winch power transmission system has been modified in two aspects i.e., the larger dia (400 mm) pulley has been changed to 480 mm diameter and also an intermediate shaft is installed between P.T.O. clutch shaft and winch drive shaft. The intermediate shaft is supported by two plummer blocks with two 'V' pulleys keyed, one each on either end. There are total 4 pulleys used in this system with 2

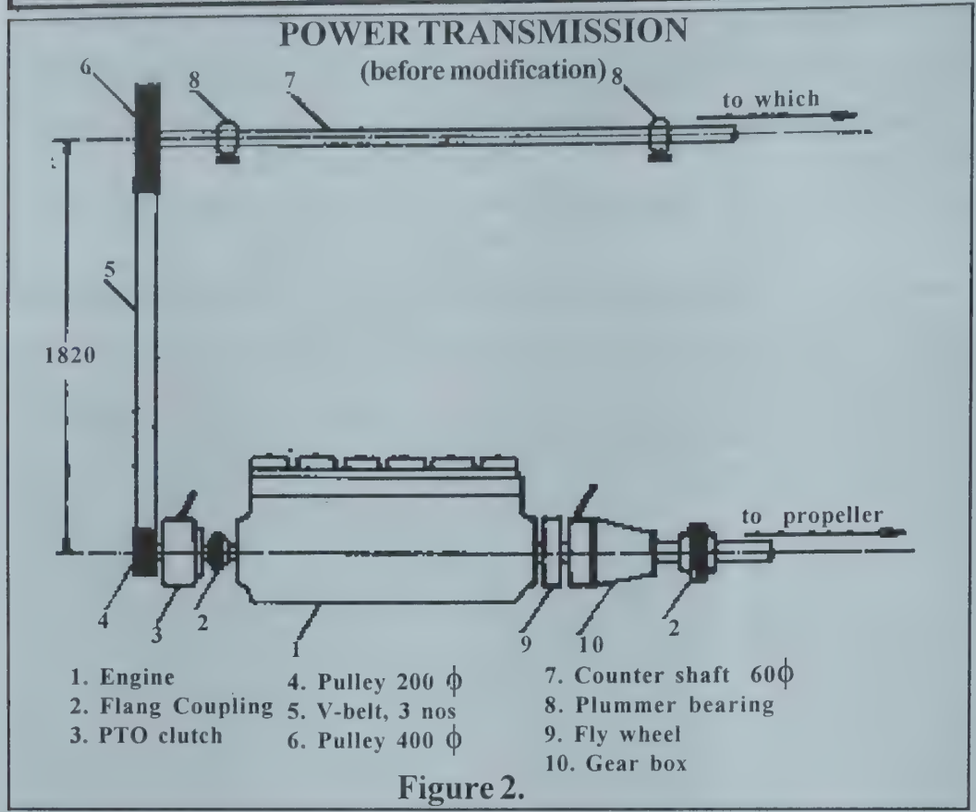


Figure 2.

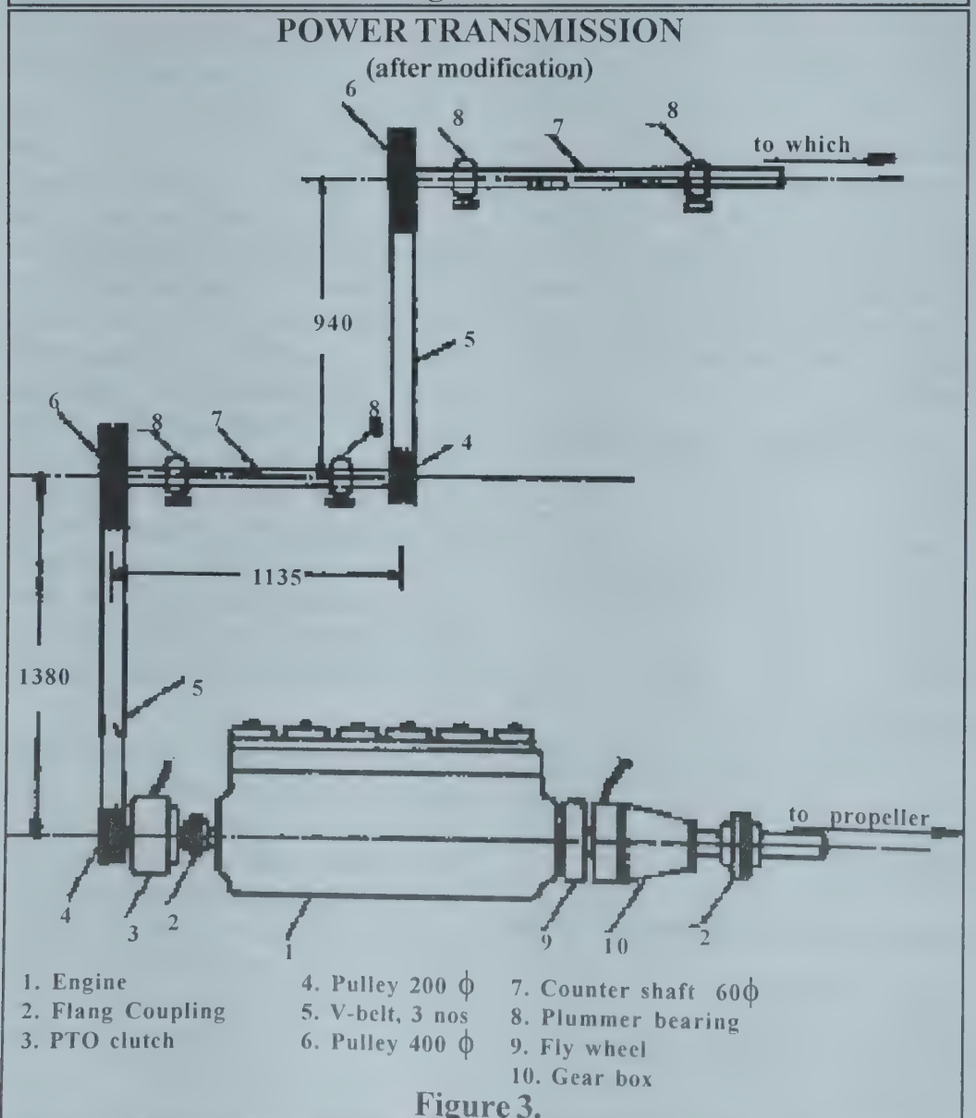


Figure 3.

sets (3 each) of 'V' belts connected (Figure 3). One end of winch drive shaft is connected to the intermediate shaft and another end is connected and fitted to the helical toothed pinion (hypoid pinion). The pinion meshes with the hypoid toothed wheel and transmits power to the winch during operation. The speed reduction (from 1500 to 250 rpm) ratio achieved by this pulley arrangement is 5.75 : 1 approximately.

Trawl Winch

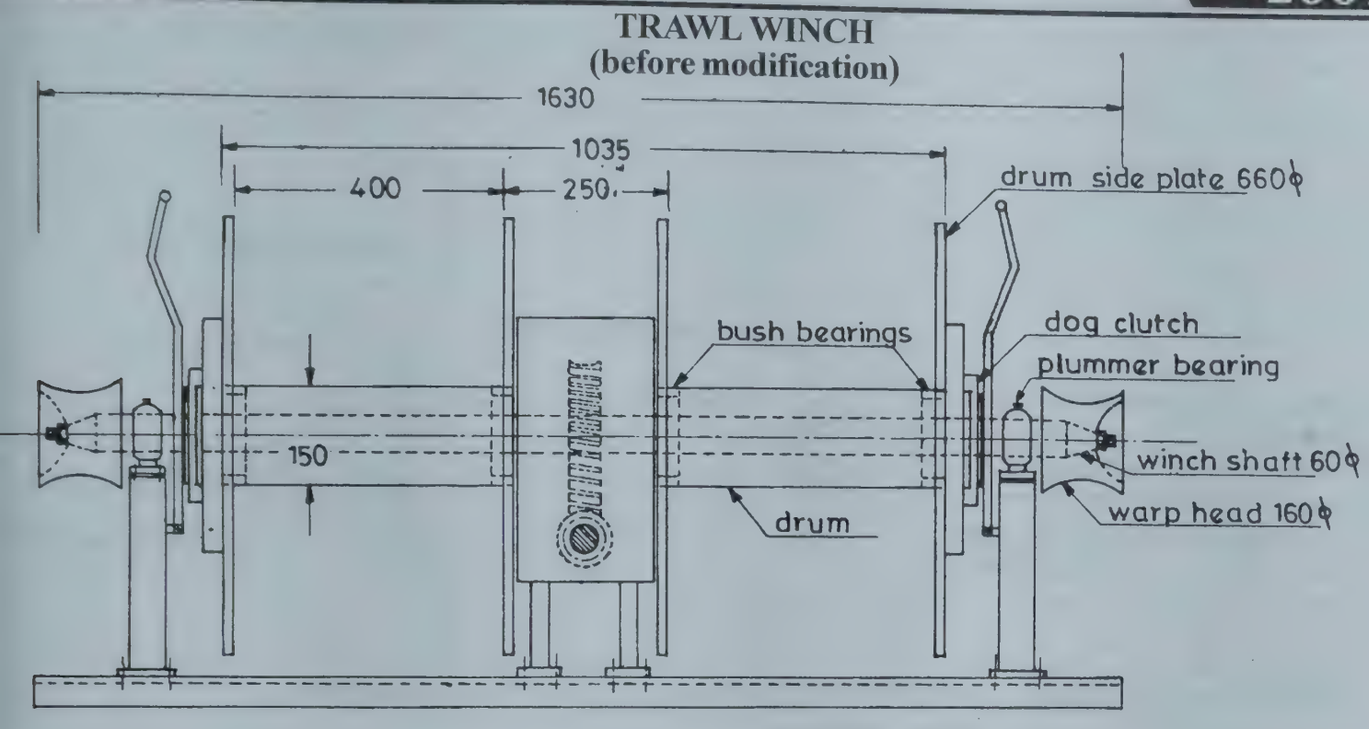
a) *Before modification*: The winch driven shaft is supported by four bush bearings with the warping drum and by the plummer bearing at the either end, the gear drive mechanism used in the winch is worm and worm wheel arrangement (Figure 4). The worm gear end of the winch drive shaft is supported by a ball bearing. The total number of teeth in the worm and worm wheel is 8 and 40 respectively and hence the speed reduction gear ratio in the winch is 5:1. The wire rope size used was 8 mm diameter having 600 m. length.

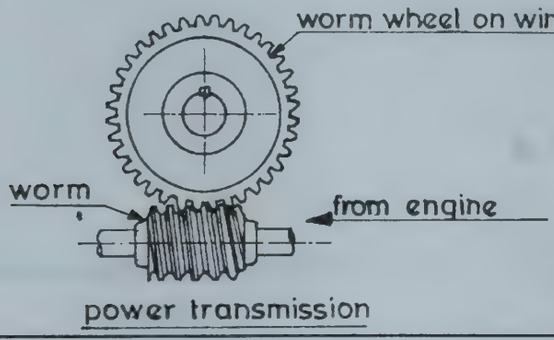
b) *After modification*: The major modification has been carried out mainly in the trawl winch to upgrade for deepsea trawling since the winch is subjected to comparatively heavier load during the operation. The modifications and changes incorporated in the old trawl winch are as follows:

i) Worm and worm wheel mechanism is replaced with the hypoid pinion and hypoid gear mechanism (Figure 5). The advantage of the hypoid gear mechanism is that it has larger area of contact between the mating teeth when meshed with each other. Hence it can sustain and transmit heavier load arising during hauling of the net in deepsea. The same gear mechanism readily available with the Benz truck is replaced here to reduce the capital cost of the equipment.

ii) The bush bearings mounted between warping drum and winch driven shaft have been replaced with tapper roller bearings to withstand heavy load.

iii) The bush bearings fitted in the plummer block at either end of the





All dimensions in mm. scale - 1:10
Figure - 4

winch driven shaft and the ball bearing supported for winch drive shaft at gear box end are replaced with ball bearings and tapper roller bearings respectively.

v) The overall length of the winch is increased from 1630 mm to 2000 mm. The outer diameter is increased from 660 mm to 710 mm and length of each warping drum is increased from 400 mm to 520 mm so as to facilitate more length of ropes to be wound on it.

v) The wire rope diameter has been enhanced from 8 mm to 10 mm and length from 600 m to 1200 m.

vi) The speed reduction gear ratio between winch drive end and driven end has been changed from 5:1 and 7:1. The total number of teeth in the hypoid pinion and hypoid gear wheel is 7 and 48 respectively, thus approximately 1/7 rpm reduction is achieved in the winch so that at lower rpm the winch can take heavy load during hauling of ropes, cables and nets.

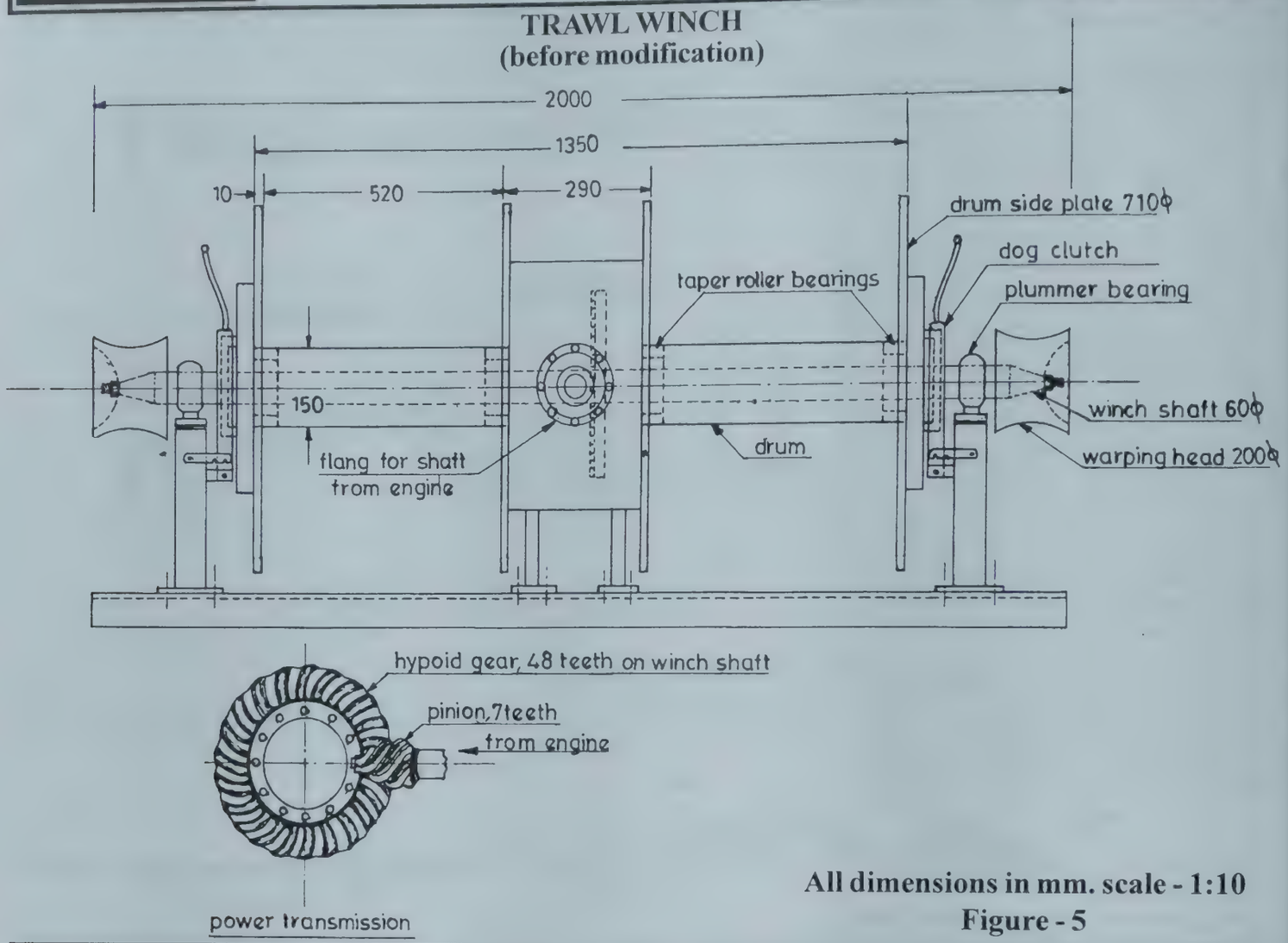
Problems faced with the existing winch and changes made

1) The worm and worm wheel teeth abrasion and damage developed were found to be of a higher rate, thus involving frequent replacement of worm and worm gear wheel mechanism. This problem is eliminated by providing hypoid gear and wheel which does not subject itself to frequent breakdown as at present due to excess wear and damage.

2) As the bearings used were mostly of bush type, they were not able to take the minor misalignment/flexibility occurring due to uneven loading when net cables are hauled. Thus bush bearings were worn out faster, leading to replacement. This problem has been overcome by providing tapper roller bearings which are designed to take the misalignment to some extent and provide flexibility in observing sudden/uneven loading during operation.

3) The 8 mm dia of wire rope was unable to sustain the heavy load during deepsea trawling causing overstretching, losing its tensile strength, elasticity and finally leading to breakage. Hence the rope size of 10 mm dia having length of 1200 m. is being used after modification.

4)The engine was getting unevenly loaded/overloaded during hauling of ropes, cables and nets etc., as the engine's free end side was directly connected to the winch drive end through a pulley and a set of 'V' belts without an intermediate shaft in the power transmission system, thus leading to radial and axial fluctuating/pulsating load directly acting on the engine which is not a healthy sign for running engine. This discrepancy has been



All dimensions in mm. scale - 1:10
Figure - 5

rectified by providing an intermediate shaft between PTO clutch and winch drive shaft, so that sudden uneven loading, uneven axial/radial thrusts arising from the winch can be partially absorbed by the intermediate shaft.

Design changes suggested

The existing 'V' belt drive mechanism for power transmission system may be changed to sprocket and chain drive mechanism to avoid power loss due to 'V' belt slippage and to have longer life when compared to 'V' belt.

Fishing Gear

A two seam trawl net having a head rope length of 33 m. and foot rope length of 36m. is operated from the stern for deepsea lobster and deepsea prawn. The details of the gear are given in Figure 6. The net is spread by V form doors made of steel having weight of 85 kg with dimension 54" x 33".

The Area: The area of operation is off south west coast of India extending from Wadge bank to Kannoor coast at a depth range of 100m. to 550 m. The area of operation of deepsea lobster and deepsea prawn (red ring) grounds are shown in Figure 7.

Operation: Due to the ban on trawling along Kerala coast from 15 June to the end of July, the vessel operates from August to May in the area from 100 m to 550 m from Wadge bank to the area off Kannoor. The vessel sails normally for a 5 day voyage. She trawls for 36 to 50 hrs (actual fishing) during the voyage within 3 days of actual fishing. The fish production generally includes Threadfin bream, Lizard fish, reef cod, miscellaneous fish, deepsea fish, Cuttle fish, Squid, Octopus, deepsea lobster, deepsea prawn etc. The annual catch from 100 to 550 m. depth will have a composition of 5% lobster, 10% red ring, 30% other deepsea small shrimp, 30% cuttle fish and the remaining fish species mentioned above. Each voyage will have an expenditure of about Rs.30,000 for HSD oil, ice and crew messing allowance. The income per voyage varies from Rs.10,000 (during less production days) to about Rs.75,000 (during the best production period). This means that there will be sometimes a loss of Rs.20,000 (Rs.30,000-10,000) for a voyage during less productive days and there will be surplus of Rs.45,000 (Rs. 75,000-30,000) on good fishing days from which 65% will be owner's share and 35% will be crew share. From the 65%, the owner has to meet the cost of maintenance of vessel, repairs and replacement of fishing gear, replacement of wire rope etc. There will be 7 crew members and each crew member will be getting an average emolument of Rs.4,000 per month over and above messing allowance. The crew also will be operating handline in

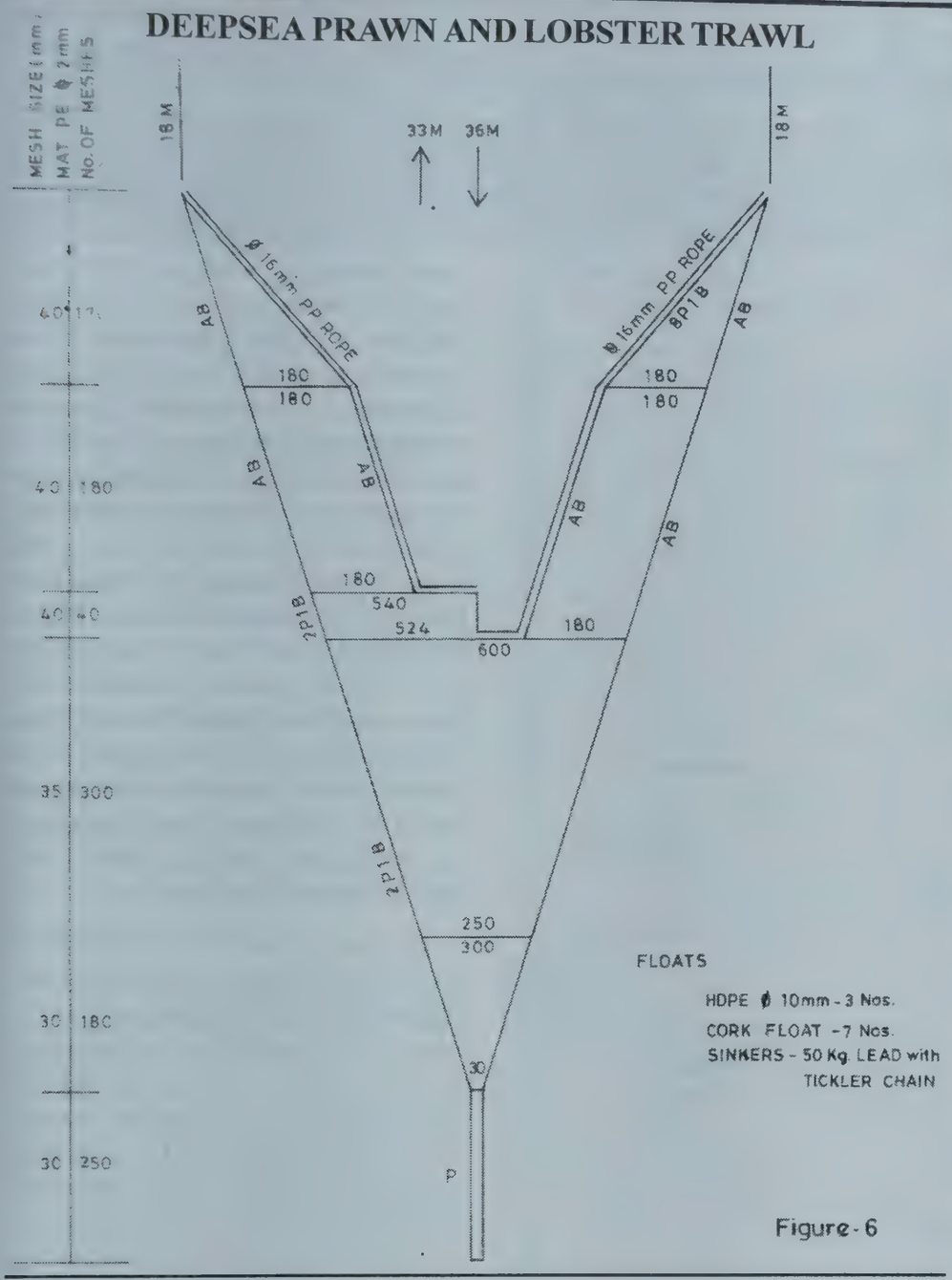


Figure - 6

the uneven rocky bottom for rock cod after the trawling operations of the day, which will add to their income. Thus the entire sea time is used for income generation. The owner will have a surplus of an average of Rs.10,000 or more per month after repayment of capital, repairs and maintenance of vessel, and replacement of fishing gear and accessories in a fairly good productive season. There will also be loss if the season is not productive. Operation of fishing vessel is one of the activities of most of the owners in Munambam who involve themselves in several other activities such as owning retail outlet of diesel/petrol, marketing of fish, functioning as agent for fishing gear accessories, part time farming etc. Thus, the total income of the owner will be the surplus from all these activities. When he sustains loss in one activity, it may be wiped out by surplus in another activity.

Discussion

Hitherto the exploitation of deepsea lobster and deepsea prawn in the west coast of India is done by large vessels having 20m. length and above. This is the first time the fishermen of Munambam are fishing for deepsea lobster and deepsea prawn from a 15m LoA vessel. This is mainly because the resources in the inshore area have dwindled and have become uneconomic to operate small and medium size mechanised vessels. The operation of large vessels has become expensive mainly due to high fuel cost and the above mentioned two factors have forced the fishermen of Munambam to move their vessels deep into the sea with their medium (50 to 60 feet/15 m LOA) vessels for trawling in the continental shelf and slope. Since there is vast difference in the Capital cost of 15m LOA vessel (Capital cost about Rs.20 lakhs) and large vessels of 20m LOA range (Capital cost about Rs.120 lakhs), the profitability of operation with the 15m LOA vessel is appreciable. The 15m LOA vessel has been converted with minimum expenditure providing space to preserve the delicate deepsea lobster, prawn and fish resources for retention for about 2-3 days in the fish hold during the voyage. The deepsea prawn and lobster are preserved using ice and it is found that the catch reaches the shore in excellent condition. The operation of these vessels for deepsea lobster and deepsea prawn during November-February and exploitation of cuttle fish from August-September and March-May and production of miscellaneous fishes from April to June from the shelf seems to be economical especially when the mechanised vessels do not have sufficient resources in the nearshore waters to sustain. October-November and February-March are less productive months during which period the vessel may not undertake voyages in all weeks, thus avoiding loss in the overall economics. The best management in the deepsea operation is to reduce loss by avoiding fishing in less productive months. Using admirality chart, GPS and echo sounder to sail as straight as possible to the fishing ground and avoiding rocky uneven bottom, located by echo sounder, to avoid loss of fishing gear are other ways to reduce loss in the operation. These 15m LoA vessels bring all catches including the miscellaneous species and deepsea fishes unlike larger vessels. Thus, they avoid discarding of fish at sea and add to the national fish production and domestic consumption.

One of the difficulties of this operation in the continental shelf and slope is related to the absence of communication system in 15m LoA vessels. Because of this they are not able to contact shore or other vessels regarding their position, catch, dangers at sea, engine failure etc.

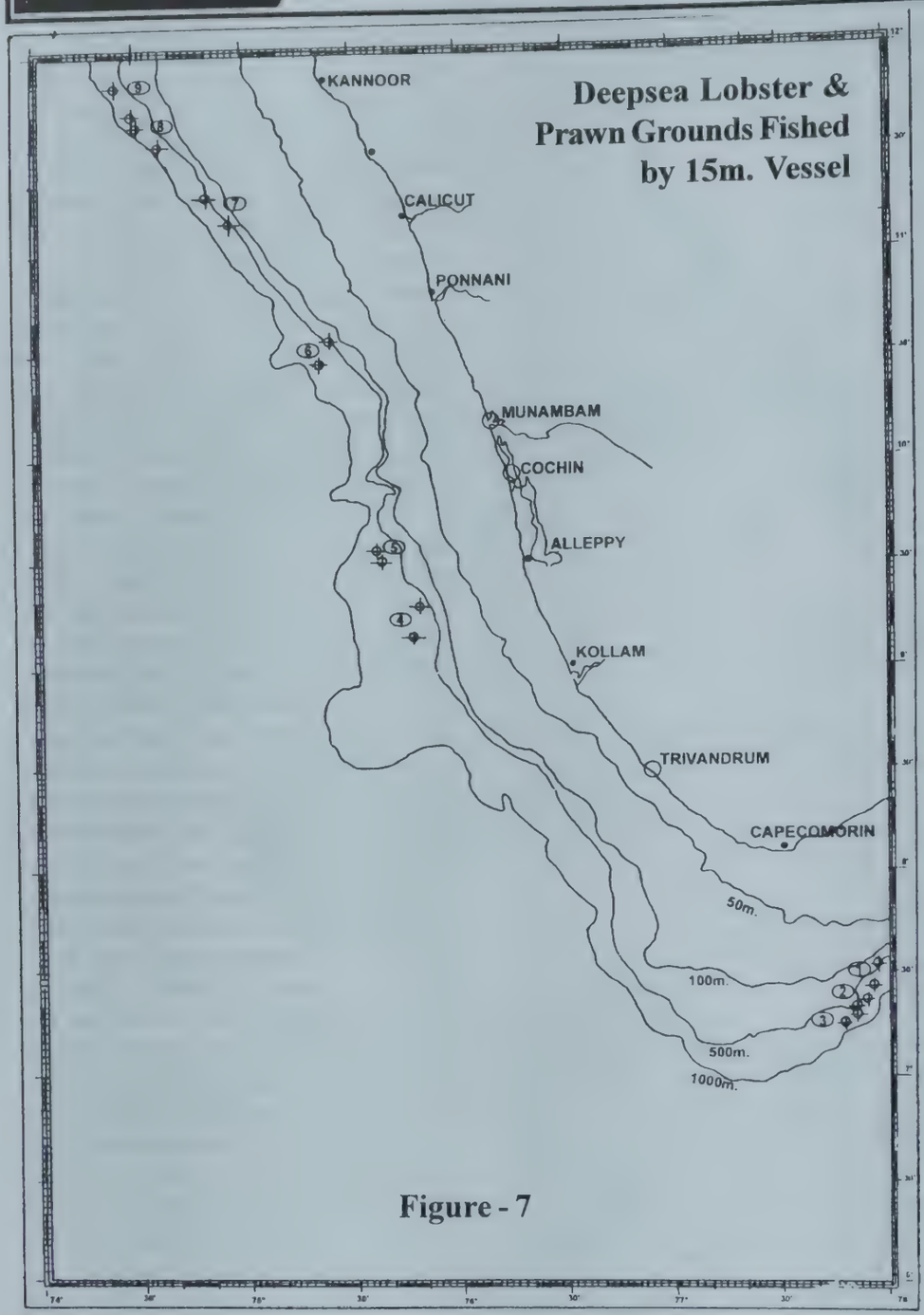


Figure - 7

They are provided with the HF communicating system because of heavy cost factor of SSB system. This problem can be overcome by establishing a community VHF through an integrated relay link communication network which will be cheaper than the HF communication system (Devadhason 1999).

It is suggested that this venture can be extended to other parts of Indian coast for exploiting deepsea lobster, deepsea shrimp, cuttle fish and fish resources with less capital and operation cost so as to augment national fish production beyond the conventional zone in the deeper continental shelf and slope.

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Training Programme for students/unemployed youth in "Preparation of aquarium for rearing of ornamental fishes"

The Kolkata Centre of Central Institute of Fisheries Education (ICAR) successfully conducted a 2-day training programme in the preparation of an aquarium, its decoration, selection and combination of ornamental fishes for keeping in an aquarium and prospect of breeding and culture of ornamental fish, for the benefit of 35 school children and unemployed youth of Kolkata. The programme was conducted in Hindi from 19 to 20 September 2001 as part of celebration of Hindi week. This training programme was coordinated by Dr.Archana Sinha, Senior Scientist. During the programme, participants were educated on the subject by oral presentations as well as partical demonstrations. A pamphlet, written by Dr. Sinha, was also released on this ocassion.

Mr. Bagish Dutt Tewari, Deputy Director (Rajbhasha) inaugurated the programme. Dr. S.C. Mukherjee, Joint Director, CIFE, Mumbai was the key speaker. Dr. K.C. Dora, Dean, WBUFAS, Mohunpur, Dr. S.K. Mukherjee, Managing Director, BTPL India Ltd., Kolkata, Dr. Amitabh Ghosh, Officer-In-charge, CICFRI centre, Salt Lake, Kolkata graced the ocassion. A small exhibition was organized at the Centre, which attracted lot of visitors. Indigenous ornamental fishes like loaches, devil catfish, glassfish, eel, and dwarf gourami were the special attraction.

Special talks were delivered by Dr. M.K. Bandopadhaya, Senior Scientist, CICFRI, Barrackpore, Dr. Amit Dutt, Assistant Research Officer, State Fisheries Research Centre, Kulia, Kalyani and Dr. Archana Sinha, Senior Scientist, CIFE, Kolkata Centre. Practical demonstrations were made by the Officers of this Centre.

After completion of two days of training programme, Certificates were distributed to the participants by Dr. R.C. Das, Officer-In-Charge of Centre.

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General Biology and Breeding of Gold Fish, *Carassius auratus*

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ICAR Research Complex for Goa, Ela, Old Goa, Goa, 403 403

Ornamental fish keeping is the second largest hobby next only to photography. The world ornamental fish trade is over 5 billion US dollars. The ornamental fish culture is one of the thrust areas in fisheries sector for augmenting export earnings. During the last three to four decades there has been considerable growth in the ornamental fish trade in countries like USA, Europe, Singapore, Hongkong, Japan, Indonesia, Philippines and Srilanka. Although India is blessed with an abundant variety of both fresh and marine water ornamental fishes, the national export earnings from ornamental fishes are very meagre (about Rs.one crore), whereas small countries like Singapore and Srilanka are earning foreign exchange several times more.

There is a tremendous scope to increase the ornamental fish export earning of India from the present level of Rs. one crore to about Rs. 110 crores over next 10-20 years. The two major problems in expansion of this trade in our country is the lack of knowledge on captive breeding techniques of most common varieties of ornamental fishes preferred by the aquarists and also the non-availability of low cost quality ornamental fish feed. Till now 90 percent of the ornamental fish feed is imported. Similarly, although breeding technology of many of the common freshwater fishes are standardised by different institutes in our country, commercial production of these fishes on scientific lines has not been taken up seriously due to gap in transfer of these available technologies. In this communication, the general biology and the propagation technique of gold fish, *Carassius auratus* is discussed which may be of great help to the farming community venturing into the breeding of this most preferred fish.

Introduction and general biology of gold fish

Since time immemorial gold fish has been one of the most sought after ornamental fish by aquarium fish keepers throughout the world, particularly in tropical countries. A community aquarium without gold fish is seen to be an incomplete one. Gold fish is generally preferred by hobbyists due to its peculiar added morphological characters like branched caudal and anal fins, telescoped type enlarged eyes, pearl like glittering scales, thickening skin on the head region and for its attractive colours.

Varieties and Types

Now so many varieties of vivid coloured gold fishes are available in the market due to hybridisation techniques followed by the breeders . The colour of gold fish may be red, orange, silver, black, blue, bronze, white, brown and many more. There are more than 30 varieties of gold fishes. These are: Common (normal), Oranda (7 varieties), Runchu, Lion head (4 varieties), Comet, Shubankin (3 varieties), Fan tail, Telescope eye, Bubble eye (2 varieties), Black moor (4 varieties), Pearl scale, Pompoms, Fringe tail, Albino, Ryukin and several others.

The fish belongs to the family Cyprinidae and the order Cypriniformes. Generally there are two types of gold fishes i.e., fancy and common or normal. The maximum length of fancy type of fish is about 6 to 8 inches in length whereas normal gold fish size may extend up to 14 inches. The oldest gold fish recorded by a hobbyist is stated to be 43+ years old. The general life span of gold fish is however around 10-12 years. It is an omnivorous fish, which feeds on a wide variety of live and prepared feeds. They swim at all levels of the water in the aquarium tank and feeds on both floating and sinking type of feeds. This is a very good fish for the community tank due to its compatibility and non-aggressiveness. Foran aquarist, the cost of the fish is also reasonable and affordable.

BREEDING OF GOLD FISH

Water quality requirement for the breeding

Temperature : Although the fish can survive a wide range of water temperature from 10.4 to 31.5 °C, the preferable temperature for growth and culture is 15.5 to 23.6 °C. For breeding purpose ideal water temperature ranges between 20.0 to 23.0 °C. Fancy variety gold fish are less tolerant to water temperature fluctuations than the normal varieties. In temperate climate breeding inducement can be done by increasing the water temperature over a period of time from 15.0 °C to 20.0 °C. Sometimes, the brooders get induced to breed by partial water exchange (25 to 30 %) in a breeding tank.

pH : The fish can tolerate pH range of 7.0 to 8.0 and for breeding the pH should be slightly alkaline (between 7.5 to 8.0).

Hardness : Gold fish prefer moderate hardness of 50 to 75 ppm mg Ca C_o3/lit

Oxygen : Preferable oxygen level for breeding is over 5 to 6 ppm.

Free Ammonia (N_H3) : < 1 ppm.

Nitrite nitrogen (N_o2) : <0.01 ppm

Nitrate Nitrogen (N_o3) : <20 ppm

Maturity and Breeding

Gold fish generally matures when they attain the size of 3 to 5 inches in length. But in the case of fancy varieties among them, they are known to mature even at a lesser size. The attainment of age of maturity extends from 9 months to 2 years. The breeding success of gold fish depends upon the proper selection of active and healthy brooders. The male

and female can be easily identified during breeding season. In case of male, white bumps or tubercles develop on the operculum and pectoral fin, with the main ray of pectoral fin having thick edge, fins becoming more pointed, lead ray of anal fin becoming thicker. Vent assumes a concave shape with a small opening. Abdomen is seen to be smaller, slender, firm and with or without ridge. Further, the general body shape becomes slender, longer and symmetrical from the top. In females, however, few or no tubercles are found in the operculum region and pectoral fin. The leading ray of pectoral fin shows a thinner edge and the other fins look rounder. Vent becomes convex and large, abdomen larger and fatty with no abdominal ridges. The general body shape of the female is influenced by fat, and it looks shorter and asymmetrical form the top.

During onset of breeding season, the male chases and harasses the female. While some of the females release more than 1,000 eggs, the general fecundity of a healthy female is around 500-700 eggs depending upon the size. The female needs soft water and shallow area for breeding. When full with eggs, the female releases a pheromone to attract the male. Generally male : female ratio is kept 2 : 1 to ensure successful breeding. A 50 lit capacity rectangular shaped aquarium tank can be used for breeding purpose. Eggs are generally released during night hours, after courtship and mating is over. Male discharges sperm simultaneous to release of egges, leading their to fertilisation. Fertilised eggs are transparent/greyish in colour and unfertilised eggs are milky white. Fungus grows very quickly on the surface of unfertilised eggs and very often the infection spreads to healthy fertilised eggs too. Considering this, it is desirable to remove the unfertilised eggs as soon as possible once the egg laying is over. Most of the eggs being sticky in nature, substratum may be maintained with soft weeds, tiles, corals etc., for the settlement of eggs.

Fertilised eggs hatch in 4-7 days depending upon the water temperature. It is necessary to remove the parents and other fishes from the breeding tank if a separate hatching tank is not used. If this is not done, the parents eat the hatchlings.

The same parents can be deployed for breeding again after 3-4 weeks. For successful repetitive breeding, the fishes have to be kept in tanks containing water of good quality and fed with high quality nutritious diet. The newly hatched young ones depend upon their yolk sac as a food source for a couple of days. When the fry becomes free-swimming they can be preferably fed with *Artemia*, *Daphnia*, *Moina*, tubifex worms, blood worms, infusoria and other phytoplankters.

Health fry of bright colour and good finnage should be reared in a separate tank and fed with balances diet for near about one month before transferring them to the breeding tank. This procedure results in a greater success rate in breeding. Kept in a tank of appropriate dimensions containing water of good quality, and fed on good feed, they can grow upto 1-4 inches within six months. Many times the eggs and hatchlings are susceptable to external pathogens like *Zoothamnium*, ciliates, protozoans, fungus (*Saprolegnia* and *Achlya*), etc. To prevent these infections, it is imperative to ensure good quality of water, and provide nutritive food. If there is any pathogen infestation or infection, chemicals like acriflavin, pottassium permanganate, malachite green, formalin, oxytetracycline, nitro-furazolidon can be used in proper doses with utmost care.

Growth calendar of gold fish

Time	*Size (length)*
Newly hatched	4mm
5 days old	5mm (free swimming)
9 days old	7mm
12 days	9mm
20 days	12mm
28 days	15mm
36 days	18mm
60 days (2 months)	20mm
90 days (3 months)	22mm
120 days (4 months)	24mm
180 days (6 months)	30mm (starts pairing).

Conclusion

Among all the egg laying aquarium fishes, gold fish lends itself to easier breeding and therefore it is considered to be the first choice for the beginners in the hobby to gain experience in breeding programmes. The breeding technology discussed in the present paper may be taken as the base material for breeding of this wonderful fish. Breeders can modify and refine technology subsequently with their experience and expertise once they get success in breeding of this fish depending on the climate and other conditions.

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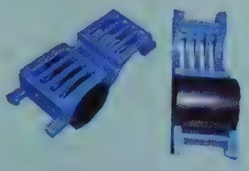
NR-A101 1HP Paddlewheel Aerator

● Spare/Replacement Parts ●

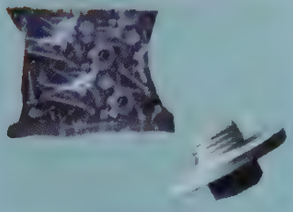


Bearing Cover&
Rubber Bushing

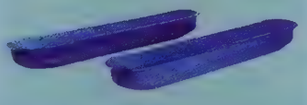
Bearing Stand

Plastic Shaft

Plastic Frame

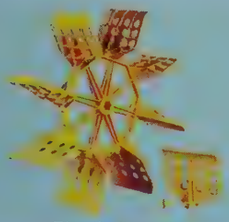


Screw Package &
Plastic Nut

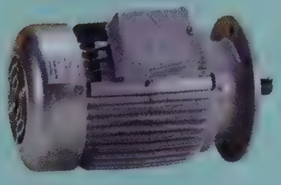


PE Float

PE Cover



Plastic Impeller



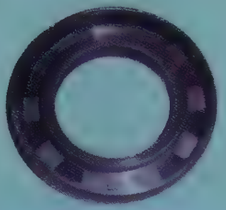
Motor

Reducer(14:1)

Motor fan

Reducer Bearing #6306

Reducer Bearing #6206

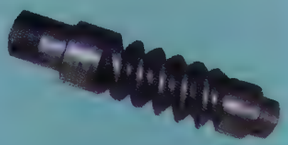


Oil Seal

Output Shaft

Worm Gear Wheel (14:1)

Reducer Bearing #30305



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Email: gkmarine@satyam.net.in

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Upgraded CMFRI's Visakha Unit Inaugurated as a Regional Centre

Visakhapatnam : dated 17 Oct 2001

The marine fisheries research activities of CMFRI had their beginning in Visakhapatnam as early as 1947. Initially set up for survey of exploited fisheries, during the past over 50 years the unit gained in strength and emerged as an important Research Centre of CMFRI. The activities having grown, with the work extending over the upper east coast (off Andhra Pradesh, Orissa and West Bengal), the Centre has now risen to a regional status and is now housed in its own building. Accordingly, ICAR has now formalised the development by according a regional status to the Centre.

The Regional Centre was inaugurated by Dr. K. Haribabu, M.L.A of A.P. assembly, representing Visakhapatnam, 1 constituency, and also a fishery industrialist, at a function held at Visakhapatnam in the premises of CMFRI. A galaxy of scientists, representatives of fishery enterprises, fisherleaders, fishermen and others participated. The function was presided over by Dr. K. Gopakumar, Deputy Director General (Fisheries) ICAR.

Dr. Mohan Joseph Modayil, extended a warm welcome to all the participants. He added a special word of welcome to Dr. K. Gopakumar, Dr. K. Hari Babu and all others on the dias. The Director told the participants that the Central Marine Fisheries Research Institute of India was the largest in Asia. He also mentioned that the marine fisheries sector was passing through a very difficult phase and the upgradation on Visakhapatnam sub-centre of CMFRI was one of the measures taken to meet the challenge.

Dr. K. Gopakumar expressed happiness that the Visakhapatnam unit of CMFRI had been upgraded to a regional status. This Visakhapatnam Centre of CMFRI, located as it is at with a major fishing harbour, a concentration of the Indian deepsea fishing industry, and a vast hinterland with a concentration of brackishwater shrimp farms, well sup

Dr. Mohan Joseph Modayil, Director, CMFRI, welcomed the participants.

A large number of messages were received wishing success of the inaugural function and wishing a bright future for the Regional Centre. Dr. K. Sriramachandra Murthy, Principal Scientist, CMFRI, Cochin, read, out of these, the messages received from the President of India, Chief Minister of A.P., Union Agriculture Minister, Dr. M.S.Swaminathan of M.S. Swaminathan Foundation, and Mr. A.K. Anthony, Chief Minister of Kerala.

On the dias (L to R) : Dr. Mohan Joseph Modayil, Dr. K. Devadasan, Mr. D.S.Murthy, Dr. K. Haribabu, Dr. K. Gopakmar, Mr. J.V.H. Dixitulu and Dr. G.Syda Rao.

Dr. Mohan Joseph Modayil, Director, CMFRI, in conversation with Dr. K.Haribabu, MLA and Mr. T.Raghunath Reddy, President, AIFI.

Dr. Haribabu unveiling the inaugaration plaque of the centre

Visitors at the Research Laboratory of the Research Centre. Dr. Mohan Joseph may be seen explaining the work being done

Participants at the inaugural Function.

ported by shrimp hatcheries and the presence of a number of processing plants had earned through its own strategic importance the status of a Regional Centre. He was confident that this upgradation would facilitate better interaction between the stake holders and scientists in respect of the development of marine fisheries resources of the upper east coast bordering the States of Andhra Pradesh, Orissa and West Bengal. He complimented the capture and culture fishery enterprises of A.P., for contributing to a significant part of the annual marine fish production and also substantially to marine products exports of India.

Report on deepsea fishing policy submitted: Gopakumar said that the committee on deepsea fishing policy had submitted a comprehensive report on the subject to the union department of animal husbandry and dairying and it was now for this department to declare the policy. While extending his best wishes to the newly formed regional centre of CMFRI at Visakhapatnam, he had also promised all cooperation and help from ICAR for achieving top results.

Inaugurating the Regional Centre, Dr. Hari Babu said that A.P. was contributing annually 25 to 30% of the total national marine products exports, (Around Rs.2500 crores out of Rs.6400 crores). He advised the regional centre to promote the development of marine aquarium fishes which were in high demand in several parts of the world. Despite the importance of fisheries and the major contributions of the sector to the national economy and developmental role played by a large population of fishermen living all along the coastline and fish farmers all over the country, it was unfortunate that a separate Ministry/Department for fisheries in the Ministry of Agriculture had not been set up so far. He appealed to the Central Government to set up a separate Ministry/Department of Fisheries, considering that specialised and concentrated attention towards fisheries development would not only increase proteinacious food production but would also provide employment to thousands, and would also augment export earnings. The setting up of a separate Ministry/ Department was all the more necessary for the reason that the development was getting retarded because of the present system of several Ministries of Central Government dealing with various segments of fisheries activity with poor coordination.

Hari Babu also pleaded for diversification of fishing which was now having a heavy bias towards shrimping. He appealed to the Fishery Survey of India to explore and identify alternative viable resources for diluting this bias which was harming the industry. He complimented CMFRI for the development of technologies in respect of pearl culture. With Tilapia fillets finding an excellent market in USA and Europe, it was high time that the CMFRI extended suitable advice to the Government for permitting culture of this resource in an eco-friendly manner. While other nations were able to culture all-male Tilapia and export its fillets, there should certainly be a way for India also to adopt viable methods for promoting the activity for national benefit. He said that it would be in the interests of other Tilapia exporting nations to discourage India from entering into this sector and this tendency would have to be countered in national interest.

He paid a compliment to the fishing industry for being more active than other sectors for being in the forefront to avail of the opportunities and the challenges posed by the new WTO regime. He exhorted the processors and exporters to adopt all needed measures to ensure the upgradation of processing technology in such a manner that value-added products could be produced and exported, particularly to US and EU. Hari Babu appealed to the Government of India to finalise all needed steps for the passage of Aquaculture Authority Bill in the parliament. In the absence of this legislation several disadvantages were encountered, he said. Vast areas, not suitable for agriculture, could be made productive for providing employment, augmenting incomes of fish farmers and contributing to export earnings.

He was happy that the deepsea fishing policy document was submitted by the Committee concerned to Department of Animal Husbandry and Dairying. He appealed to the authorities to finalise and announce the policy soon so as to provide a frame work for the deepsea fishing industry to move forward and play its part in the exploitation and utilisation of deepsea resources.

Concluding, he congratulated CMFRI and its scientists for their outstanding contributions for the development of marine fisheries sector. Felicitations were offered by Mr. D.S. Murthy, Commissioner of Fisheries, Andhra Pradesh, Dr. K. Devadasan, Director, Central Institute of Fisheries Technology, Cochin and Mr. J.V.H. Dixitulu, Editor, *Fishing Chimes*. Dr. G. Syda Rao, Officer-in-charge, Visakhapatnam Regional Centre of CMFRI proposed a vote of thanks.

Rs. 7.5 crores sanctioned for Bhavananpadu Fishing Harbour, in A.P.

Rs. 7.5 crores have been sanctioned for works related to the Bhavanapadu fishing harbour in Srikakulam district, according to Deputy Director of Fisheries, Mr. B.Basheer Ahmed.

It is stated that the harbour long pending renovation work is now entrusted to a Canadian firm. The harbour's entrance is to be widened by 4.5 metres and engineers of the Canadian firm, W F Bryd Association, would be involved in the task. The works were discussed in detail at the Fisheries Commissionerate in Hyderabad on September 29. Once the works are completed,fishing vessels of madium range would be able to berth in the harbour. Funds are expected to be provided by the Central and State government.

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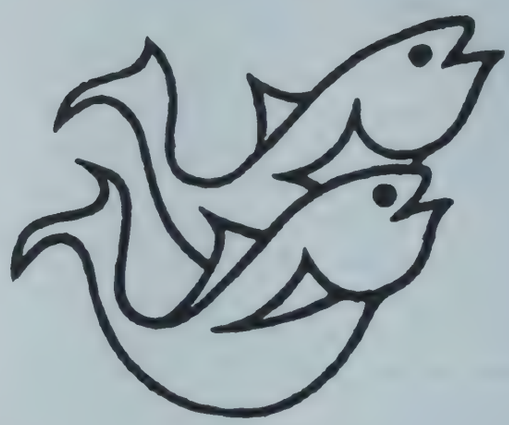

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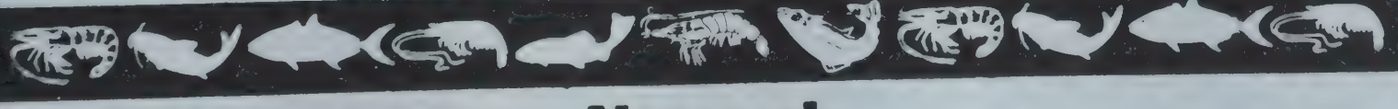

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Potential and Status of Aquaculture in Uttar Pradesh

Vinod Kumar Bist, Manager, Regional Office, NABARD, Lucknow

Food grain production through agriculture has more or less reached a level of saturation. This indicates that it is high time to develop and utilise our aquatic resources to augment food supplies through fish production.

Uttar Pradesh has vast aquatic resources which could be well utilised for augmenting fish production. Potential for fisheries in the State exists in the form of 28,514 km of fluviatile waters (rivers and canals) and 4,32,024 ha of confined waters (which include 1,37,949 ha of man-made reservoirs, 1,32,703 ha of natural lakes and 1,61,372 ha of village ponds). Apart from these, there are more than 6400 ha of newly excavated fish ponds in the State. Ponds owned by the gram sabhas with a total area of 1.116 lakh ha are being given on long term lease to the fish farmers (area between 0.20 to 5.0 ha) for undertaking aquaculture. Of this, about 0.916 lakh ha of village ponds have been brought under fish culture by the end of the year 2000-01. Larger sized village ponds (i.e.,beyond 5.0 ha) are leased out to the Fish Farmers' Co-operatives Societies. All the districts in the State have now been covered under the centrally sponsored FFDA programme.

Uttar Pradesh ranks sixth in the country in terms of inland fish production. The total fish and fish seed production in the State is on the rise. During the year 2000-01 a total of 2.083 lakh t of fish were produced from capture as well as culture fishery resources. Nearly 20% of the total produce is marketed outside the State. In the same year, seed production at the government fish seed farms (Matsya Nigam and Departmental seed farms) was to the tune of 34.25 crores. The mini-fish seed hatcheries in the private sector as well as the seed rearers produced about 53.33 crores of fish seed. Thus, as against a total fish seed demand of about 100 crores of carp fingerlings, the total production in the State was 88.28 crore nos. The rest of the demand was met by importing seeds from other States, mainly West Bengal. Major sources of seed supply in the State are the 10 modern hatcheries under the UP Matsya Vikas Nigam, 49 seed farms of the Department of Fisheries, and 66 mini hatcheries financed in the private sector with the help of FFDAs. Both fish and fish seed production over the past few years are on the rise as will be evident from the following data:

Year	*Fish Production (tonnes)*	*Seed Production (nos/lakh)*
1996-1997	1.495	6,200
1997-1998	1.600	6,513
1998-1999	1.850	5,578
1999-2000	1.930	8,065
2000-2001	2.083	8,828

The cause of concern, however, is the low per unit fish productivity. In comparison to the all India average productivity of about 2500 kg/ha/year, the corresponding productivity for Uttar Pradesh is somewhat less at 2350 kg/ha/year. This is quite low when compared with per unit production levels in States like Punjab and Haryana, where, the average productivity is about 5000 kg/ha/year.

Some of the important reasons for the disquieting state of affairs in Uttar Pradesh can be summarised as under:

1. Faulty pond leasing policy of the State Govt. which favours only the fishermen community.
2. Weak extension machinery which is adversely affecting the training programmes and impeding follow-up measures for promoting seed production and fish culture.
3. A large area of village ponds to the extent of nearly 20,000 ha remain unutilised. Large extents of low-lying areas also are left fallow.
4. Short supply of quality seed and its timely availability is a constraint.
5. Stamp duty being charged by the State Government on registering mortagage for availing of any loan for an amount exceeding Rs. 1,00,000 is high. It is levied at Rs.70 for every Rs.1000 of loan. This is demotivating the farmers.

6. Publicity in respect of the various fishery development schemes as also new and innovative schemes amongst the farmers is inadequate.
7. Several fish farmers do not follow the scientific package of practices given to them for augmenting production. This has resulted in poor productivity. There are instances when no feed is provided to the stocked fishes in a fish pond.
8. Financial institutions, especially, the Commercial Banks (including the Regional Rural Banks) and the Co-operative Banks do not actively extend finance for fisheries schemes considering them to be a risky ventures.
9. Larger water bodies / reservoirs are not being utilised effectively by the fishermen co-operative societies for fish culture/capture.
10. Problem of stunted seeds is causing a setback to the farmers.

Institutional finance is a vital factor or driving force for any activity to flourish and this is true especially with reference to all the farm sector activities. As far as aquaculture is concerned, the ground level credit (GLC) flow in the State of UP has been showing a steady growth. However, considering the vast potentials existing in the State, the credit flow seems to be negligible. Therefore, the financial institutions will have to play a pivotal role in promoting and popularising the activity and also in lending support to developing enterprises. Extension is per-

haps one of the weakest links in achieving speedier and effective fisheries development in the State. There are several districts, where, a single extension officer of the FFDA has to cover more than three to four blocks within each district. Further, fish farming is yet to be taken up on commercial lines as an enterprise by the farmers. Except for a few successful farmers, scattered mostly in the eastern part of the State, fish culture has been taken as a subsidiary activity. Important districts in the State from fishculture point of view are Fatehpur, Faizabad, Mau, Varanasi, Jaunpur, Deoria, Ghazipur, Azamgarh, Pratapgarh, Baharaich, Bulandshahar and Siddharthnagar.

Suggestions

Some suggestions for improving the status of fisheries development of Uttar Pradesh could be:

i. FFDAs may be entrusted with the task of formulating suitable bankable schemes to utilize the unutilised lentic resources such as village ponds, abandoned brick-kilns, low-lying marshy areas and water-logged lands so as to enhance fish production and also to generate employment in the rural sector.

ii. The village ponds may be leased out not only to persons belonging to 'machhua community' (fisher community) but also to other interested persons who are trained in aquaculture by the FFDAs. Lease of ponds upto 2.0 ha size may not be given to persons outside the Gram Sabha. If persons from the 'machhua community' are not available, than the lease can be awarded to any enterprising trained individual. In the case of larger village ponds, lease may be given to a fish farmers' co-operative society of that area. Suitable modifications in the existing orders of the government in this regard may be required.

iii. The State Government has to think seriously about improving the extension support for not only identifying proper beneficiaries but also for providing them adequate training and follow-up. For improvement in the extension machinery, the FFDAs in the districts may provide training in fish farm management to the 'Bahuuddeshiya karmies' (multidisciplinary workers) who would help in popularizing fish farming schemes while also providing the necessary extension facility to the farmers.

iv. To meet the shortage of seed, the hatcheries under the control of Matsya Nigam need to be modernized/improved and seed production in the private sector needs to be boosted. Further, to keep track of the proper seed quality, a directory of seed producers/suppliers/rearers has to be prepared at the district level by the FFDAs.

v. In order to bring diversification in the fish farming sector, the Department of Fisheries and the FFDAs should popularize integrated fish farming, freshwater prawn culture, semi-intensive aquaculture, ornamental fish breeding and culture etc. In order to have a demonstration effect, the FFDAs may think of developing a model/demonstration fish pond at least one in every tehsil. Another way of popularizing fish farming could be through distribution of pamphlets, reading materials or through AIR.

vi. In order to boost the productivity in the fish ponds, it is necessary to conduct refresher training programme for the already trained farmers all over the State by the Department of Fisheries/FFDAs. Banks, especially the Commercial Banks and the RRBs may be urged to promote the activity on priority, since, aquaculture has already been proved to be one of the most remunerative activities in the farm sector. Further, district level banker forums like DCC and DLRC can be utilised effectively by the FFDAs in raising and sorting out issues pertaining to the fisheries sector.

vii. It is suggested that the fisheries rights over bigger ponds or small reservoirs could be given on long term lease to the fish farmers' co-operative societies for undertaking fish culture activity. The societies can also be financed through the District Co-operative Banks.

viii. Bankers have a feeling that poor recovery in fish farming sector is a negative factor/hurdle in financing fresh cases. FFDA staff may assist the bankers during the recovery campaigns.

ix. Charging of stamp duty by the State Government on registering mortgage related to any loan for an amount exceeding Rs. 1,00,000 is demotivating the farmers. Government may think of increasing the exemption limit (free of Stamp duty) to at least Rs.2.50 lakhs or upto the prevailing NABARD's unit cost. Meanwhile, the banks may provide finance to the fisheries units including the stamp duty amount.

x. Although FFDA is a member in the selection of beneficiaries while leasing of Gram Panchayat ponds for fishculture, the fact is that, they do not have a say in the selection process. The actual selection is done by the SDMs at the Tehsil level. To have proper selection of enterprising individuals, with requisite technical skills, it is necessary to make provision for nodal department/FFDA to have the final say. Necessary Government Order in this regard needs to be issued.

xi. Department of Fisheries and the Matsya Nigam may bring improvement in their seed quality and the FFDAs may ensure providing quality seeds in required quantities to the fish farmers.

It is necessary to remove the afore mentioned bottlenecks so that the fish productivity and the overall fish production in the State could be enhanced from the existing level of 2350 kg/ha/yr and 2.08 lakh t/yr respectively to 3500 kg/ha/yr and 4.00 lakh t respectively. Besides providing the much needed protein to the people, such an approach would also be able to generate employment in the rural areas in terms of farm labour, marketing and processing. In view of saturation in the agriculture front, the time has come for extending due importance and popularity to diversified activities like aquaculture, where, productivity and income are much more than the conventional agriculture or most of the other farm based activities.

Wireless Communication System and Fishermen's Safety at Sea

T.D. Valayudhan
Deputy Director of Fisheries
Fisheries Directorate, Vikas Bhavan
Thiruvanthapuram - 695 033

The fishing industry is perhaps one of the most accident-prone industries with poor safety record. The incidents of distress while fishing at sea are increasing at an alarming rate all over the world. In Sweden 2500 people are reported missing at sea annually. As much as 15 men and 50 boats are missing every year in U.K. The developed countries have generated the technical capability to respond to crises of such a magnitude. A developing country like India has to pay increasing attention for fishermen's safety at sea and take initiatives to minimise mishaps at sea.

The Code of Conduct for Responsible Fisheries (CCRF) adopted by FAO Member governments in 1995 for the sustainable development and management of fisheries insists that fishing by maritime nations is to be conducted with due regard to the safety of fishermen and prevention of damage or loss of fishing gear. Therefore, in future, appropriate safety requirements for all fishing vessels are to be adopted and maritime Search and Rescue (SAR) systems are to be integrated with fishing operations. The Search and Rescue (SAR) Scheme is to be organised as a measure of ensuring livelihood security of fisher community.

Almost two lakhs of fisherfolk are engaged in fishing along 590 km long coastline of Kerala for their livelihood. The State is reported to have the largest fishing fleet in the country. The fishing fleet includes 5,200 mechanised boats, 17,000 motorised crafts and 28,000 non-motorised traditional crafts. Due to the peculiar oceanographic and climatic conditions prevailing in Kerala mishaps at sea, particularly during monsoon season involving the lives of fishermen and their property, are frequent. The weather warnings put out by the Department of Fisheries to dissuade fishermen from setting out to the turbulent sea often go unheeded. The incidents of fishermen from Kerala coast going astray across the ocean, pulled away by strong currents and landing as far as Sri Lanka, Bangladesh or Pakistan are not rare. These fishermen caught in the turbulent sea after waging a traumatic battle for life, survive only to undergo interrogation and imprisonment in an alien land. This emphasises the need to strengthen surveillance to rescue fishermen lost in the sea.

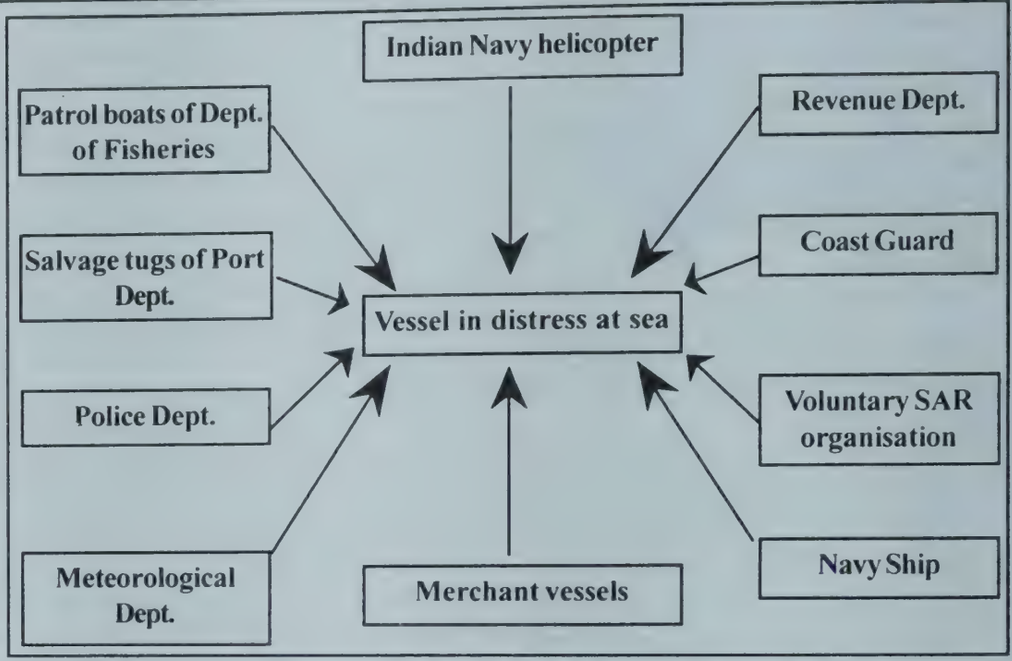

Fig1. Sketch showing the role of various agencies involved in search and rescue action when someone is reported lost at sea.

Search and Rescue Scheme

The Government of Kerala have given serious attention to the safety of fishermen at sea and accordingly introduced 'Sea Rescue Scheme for fishermen' in 1984. The scheme aims at reducing accidents in sea, rendering expeditious assistance to fishermen in distress and extending quick relief. Various Government departments and agencies are involved in the implementation of the scheme (See Fig-1)

Duties and Responsibilities of Participating Departments.

The roles and responsibilities of various Departments / agencies involved in SAR are furnished below :

Department of Fisheries: 1) Department of Fisheries conveys weather warnings through newspapers, television and radio and also directly by making public announcements. General awareness is created among fishermen about the importance of weather warning, reading of port signals, survival techniques etc; 2) All fishery stations (FS) under the Department of fisheries have fully equipped floating vessels in seaworthy condition; 3) At times of distress, the Director of Fisheries, if necessary, will contact the District Collector for assistance of Navy for SAR operation, and 4) All Matsyabhavans, offices in coastal panchyats will keep sufficient stock of life jackets and life buoys for use during emergency.

Table - I

Search and Rescue Boats

Sl. No.	*Name of Rescue vessel*	*Loa/Speed/HP*	*Base Station/ Districts*	*Details of crew*
1	Kaveri	14.842 M 20 knots 2X823 HP	Vizhinjam Trivandrum	Engineer (MFV), Skipper, Engine Driver, Mate & Deckhands.
2.	Kallyani	14.811 M 20 knots 2X 823 HP	Neendakara Quilon	Engineer (MFV), Skipper, Engine Driver, Mate & Deckhands.
3.	Kalpaka	14.828 M 20 knots 2X 82 HP	Vypeen, Ernakulam	Engineer (MFV), Skipper, Engine Driver, Mate & Deckhands.
4.	Krishna	14.842 M 20 knots 2X 823	Beypore Kozhikode	Engineer (MFV), Skipper, Engine Driver, Mate & Deckhands.
5.	Karuna	14.8128 M 20 knots 2X823 HP	Kannur	Engineer (MFV), Skipper, Engine Driver, Mate & Deckhands.

Department of Ports: 1) Port Department, on receipt of the weather warnings from the Meteorological Centre, Thiruvananthapuram, will immediately display appropriate danger signals. The fishermen will be dissuaded from going out to the sea during adverse weather conditions; 2) The Director of Ports will assist SAR operation by providing tugs and launches under his control; 3) The officers in charge of Port offices will expeditiously act according to the directions of the District Collector to assist in SAR operation; 4) Director of Ports at the request of the Fisheries Director or District Collector will organise SAR operation with all available means; and 5) Port officers will also alert the merchant ships in the vicinity and request their help in SAR.

Department of Revenue: 1) The District Collectors of coastal districts will be responsible for the overall co-ordination of SAR operations; 2) In consultation with the Port officer the District Collector will arrange SAR at sea with the available vessels; 3) The District Collector will seek not only the assistance of the Departments of Ports and Fisheries but will also mobilize the support of Police, Health and other departments concerned as and when required. In case of extreme emergency the concerned District Collector transmits the request through the District Collector, Ernakulam, who in turn seeks the assistance of the Navy directly for aerial search; and 4) The District Collector, if found necessary, will also request Cochin Port Trust and Customs to make available their floating vessels for SAR.

Department of Police: The assistance and coordination of the Police Department will be required not only for maintenance of law and order but also for the actual relief operation during emergency.

Department of Fire Force: If necessary, the Department of Fire Force will provide necessary men and materials at its disposal as necessary for SAR over land and sea.

Meterological Department: The Meterological Department transmits weather warnings to appropriate destinations for necessary remedial measures during squally weather conditions.

Indian Navy: The Indian Navy is responsible for co-ordination of aerial search and rescue operation over land and sea.

Coast Guard: The Coast Guard will provide protection to fishermen at sea and assist for SAR of fishermen in distress at sea.

Structure of SAR organisation

The Department of Fisheries has established SAR organisation with competent personnel and necessary equipments and accessories to render assistance to fishermen in distress at sea. There is a Marine Enforcement & Vigilance Wing under the control of a Superintendent of Police with 60 nos of police personnel, responsible for implementing KMFR Act. The wing is also responsible for the implementation of SAR. The SAR is organised from five Fisheries Stations (FS), based at Vizhinjam, Nendakara, Vypeen, Beypore under the leadership of an Officer in the cadre of Deputy Director of Fisheries. One Assistant Director of Fisheries and a certain number of Superintendents assist him with boat crew and police force. All these form the standing mechanism to carry out SAR. Fishery Stations are equipped with 5 twin screw patrol boats, namely; Kaveri, Kalyani, Kalpaka, Krishna and Karuna, the details of which are furnished in Table-I.

During monsoon season, from 15th May to 31st August Fisheries Control Rooms (FCR) are opened and they function round the clock in 9 coastal districts attached to the office of Dy. Director of Fisheries and Fisheries Stations (FS) for the effective implementation of SAR. The FCR are set up with the following objectives:

(a) to receive information in case of distress at sea and arrange speedy SAR operation by deploying rescue boats. If necessary, the services of naval helicopter, coast guard etc are arranged.

Table-2

SAR conducted during 1996-1999 to 1999-2000

Period	*No. of SAR*	*No. of aerial search*	*No. of fishermen saved*
1996-1999	190	NA	463
1999-2000	94	NA	346
Total:	**284**	**NA**	**819**

(b) to give wide publicity for the weather warnings received from Meteorological Department and hoisting of weather warning signals.

Methodology of SAR

If someone is reported missing while fishing, the mishap will be informed immediately in the control room. Details like location, type of vessel, length, width and colour of vessel, registered number of vessel and details of fishermen in distress etc., will be recorded in the Fisheries Control Room (FCR). A responsible officer in charge of the control room will alert the concerned departments to initiate SAR. Message will go round by wireless, telephone etc. The rescue boats will be deployed for search. The District Collector will coordinate the rescue operations at District level. In case the capsized vessel is located and fishermen rescued, the matter is immediately informed to the family members of fishermen. In case the rescue vessels fail to detect the missing fishermen naval helicopters will be called in to join the search along with Indian Navy whose assistance will be sought.

During the last four years 284 SAR operations were organised and the lives of 819 fishermen were saved, the details of which are furnished in Table-2:

Trained Squad for Search and Rescue Operation

Having felt that training to fishermen on marine engine use and safety equipments (SAR) is inevitable the state , fisheries Department has introduced a new scheme to equip coastal Matsyabhavans with a rescue squad, trained in SAR operations. Trained youths aid at sea in repair and maintenance of sea safety equipments and handling Walkie-talkies etc. Basic information on first aid is imparted to fishermen to equip them to treat serious wounds to fishermen at sea and keep the injured persons alive until they receive proper medical attention at shore. How to rig and set anchor, how to take a disabled boat in tow and how to plug a leak are some other vital aspects of training.

Training to fishermen on SAR is given by well experienced Navy personnel. Such a trained cadre provides a village level rapport with SAR organisation of departmeent of fisheries. Village level sea safety awareness camps are organised in Matsyabhavans established in coastal Panchayats. Survival training will prepare fishermen to cope with the rigours of an extended period at sea by enabling them to collect and conserve drinking water, to avoid heat exhaustion, dehydration or hypothermia. All fishermen sought to know how to revive apparently drowned ones by artificial respiration or mouth to mouth resuscitation. Therefore, they are trained in the use of life buoys, life jackets etc. They are also trained in making signals with bare hands or flags to indicate their distress situation to others. A proper understanding of the weather warning signals hoisted on the shore is yet another objective of the training programmes.

Wireless communication net work for SAR

The question of locating the fishermen lost in the turbulent sea is a rather difficult proposition. Due to various reasons even aerial search using naval helicopters may not be often successful. This problem can be solved to a large extent with the introduction of wireless communication system for SAR. The department of fisheries, Kerala is perhaps the only fisheries department in the country to establish wireless communication system for SAR. The system has been replicated from Thiruvanthapuram to Ernakulam district during 1st phase. It is proposed to extend this upto Kasaragode district during the 2nd phase. The coastal Matsyabhavans, district headquarters, fisheries Stations and the directorate are inter-linked with Wireless Communication Net Work. Hill Top Repeater (HTRS) Stations have been established at Ponmudi, and Kudayathoor. Coastal Repeater Stations (CRS) are set up at Vikas Bhavan, Vizhinjam, Neendakara, Alappuzha and Vypeen to facilitate communication with shore establishments. The patrol boats are equipped with mobile stations. The benefits of the wireless system are made available to the fishermen at sea engaged in fishing by providing Walkie-talkies.

Walkie-talkies carried on board the fishing vessels will enable the Department of Fisheries to quickly detect a vessel in distress at sea. Using Walkie talkies fishermen can establish contacts not only with the shore stations but also with other fishermen engaged in fishing and make requests for rescue operations. The direction of wind, nature of accident, the address of crew in the vessel, location of mishaps etc can be furnished, which will expedite SAR operations. They can also make direct contacts with patrol boats engaged in search. The wireless system can also be used to communicate meteorological warnings to fishermen. Such a system can go a long way in catering to the diverse SAR needs of fisherfolk in the state.

Safety Equipments and SAR Service.

It is disturbing to note that there is scanty care shown for ensuring the safety of lives of crew in the fishing vessel in spite of spending huge amounts for the procurement of modern gadgets for fishing operations. In order to ensure safety and survival of fisherfolk while fishing, adequate precautions are to be taken as stipulated by the Mercantile Marine Department such as ensuring condition of vessel, provision for safety equipment, training to fishermen etc. The safety equipments are to be carried on board the vessel on every trip, even though these instruments may have to be used only once in a year. List of safety instruments to be used in small fishing fleet is given below.

1. A first aid kit
2. Emergency rations such as biscuits, glucose, drinking water etc., packed in airtight **tins** or **cans**
3. Tools and *spare parts* of the engine
4. An oil lamp and oil
5. A fire extinguisher
6. One or more anchors and anchor lines

7. A sea anchor
8. A life line and life buoy or float
9. An emergency sail
10. A magnetic compass
11. A set of oars or paddles
12. A whistle, bell or hooter
13. A bucket for bailing or catching water
14. A pair of signaling flags

Use of these simple instruments no doubt can make a lot of difference between life and death. A number of fishing boats, after engine trouble, have drifted across the ocean for the simple reason that emergency sails, tools, oars or spare parts are not carried on board. Crew in distress have suffered terribly due to lack of elementary means to collect or store freshwater or food or medical supplies. A magnetic compass used in a small fishing boat can reduce the steaming time and prevent the danger of getting lost at sea.

Training in safety, seamanship and navigation can equip skippers and crew to grapple with emergencies. FAO has published a very useful training guide for fishermen entitled 'Document for Guidance on Fishermen's Training and the Certification'. Appropriate provisions are to be incorporated in the KMFR Act so that fishermen will carry basic safety equipments on board the vessels which will facilitate SAR operation and will reduce the incidents of mishaps during inclement weather conditions at sea.

Distress Relief to Fishermen

The state government has taken measures to promote access to insurance coverage by fishermen against death or disability to protect their own interests. The Kerala fishermen's Welfare Fund Board (Matsyaboard) arranges immediate relief assistance under Group Accident Insurance Scheme at Rs. one lakh for death or total disability while fishing. For partial disability, assistance at Rs.50,000 is granted. Matsyafed will arrange an insurance amount of Rs.1.5 lakhs under Janatha Insurance Scheme for death while fishing.

Conclusion

A maritime State like Kerala has the moral responsibility to take action on many fronts for ensuring the safety of fishermen at sea. Introduction of wireless communication system for SAR to reduce mishaps at sea is a revolutionary step in the right direction in tune with the principles of Code of Conduct for Responsible Fisheries (CCRF).

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Ramanujam's Report on Shrimp Farms Triggers Protest

Mr. Justice Ramanujam, Chairman, Aquaculture Authority, is reported to have submitted his report on impact of shrimp farms on economy and environment, in which he said that shrimp farms did not have any adverse impact on economy and environment in coastal districts.

Several NGOs representing fisherfolk expressed themselves against the contents of the report given to the Supreme Court, it is learnt "We are shocked at the blatant and anti-people stand in the report", Mr. S. Jaganathan of the Gram Swaraj Movement and Dr. D. Gabriele, NAPM, are reported to have said. The report ignored the expert reports which were acknowledged in the 1996 Supreme Court judgement, it is commented.

For the past several years the environment lobbs have been fighting against the spread of aquaculture/shrimp farms in coastal districts, alleging that they affected farm land and coastal mangroves and salinised sub-soil water. Effluents from shrimp farms destroyed marine life, according to them.

In 1996, the Supreme Court ordered closure of all farms countrywide. Today 30,000 acres were under prawn culture in the Cauvery delta, affecting agricultural labourers, Dalits and fisherfolk. There were fasts and other non-violent protests against the farms. Huge demonstrations were held in Chennai and Nagapattinam. The issue had drawn a nationwide attention as shrimp farm effluents were "destroying major lakes like Chilka and Pulicat".

The environmentalists are chagined that all these had been ignored by the Aquaculture Authority which was created to monitor implementation of the Supreme Court order. It, however, said 90 per cent of the people supported shrimp culture.

Over 200 members of the Struggle Coordination Committee against shrimp Industries were taken into preventive custody when they tried to picket a hotel in which the 4th World Conference of Shrimp Industry was being held. The arrested persons, including Ms. Mythili Sivaraman, national vice-president, All India Democratic Women's Association, Ms. Jesu Rathinam, convener, Campaign Against Shrimp Industries, besides members of various people's forums claiming to be affected by shrimp farms were later released.

Meanwhile, another group of protesters led by Mr. S. Jaganathan of Tamilnadu Gram Swaraj Movement, took out a procession on 27 September from Panagal Park, T.Nagar to Shastri Bhavan, and submitted a memorandum to officials of the Aquaculture Authority.

The memorandum noted that despite a Supreme Court order prohibiting shrimp farming in the coastal zones, many farms were being run, affecting the life and environment of fishing community.

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Changing Scenario of Riverine Fisheries of River Ganga around Allahabad

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Fishes are a natural renewable resource, not only in terms of biodiversity but as a source of high quality animal protein food for the people. From fisheries point of view, the Ganga river system occupies an important position. It is known to harbour 265 fish species, out of which 36 fish species are of varying commercial importance. It is known that this river is the original habitat of the most prized carp species, viz., *Catla catla, Cirrhinus mrigala, Labeo rohita* and *L. calbasu*, which form the backbone of Indian aquaculture.

Unfortunately, man's interference with the riverine environment in the name of economic development in recent past has exerted great stress on the biodiversity of our river systems. River Ganga, being no exception, has also suffered great losses in its bio-diversity. Many popular fish forms, which were once abundantly available in local fish markets, are becoming rare. The populations of the gangetic dolphin, *Platanista gangetica* (Roxburgh), the freshwater ray, *Dasyatis fluviatitis*, and the clupeid, *Hilsa ilisha* have drastically declined. The present communication is an attempt to record the time scale changes in the fisheries of river Ganga around Allahabad in this context.

The rivers of Allahabad district belong to the main river system of Ganga and comprise several subsystems of which the most important are the Yamuna and Tons. Other minor systems include Varuna and Sai. The Gangetic catchment around Allahabad is characterised by prolonged dry season followed by turbulent monsoon. The normal rainfall in the district is about 975.4 mm (38.40 inches)/annum. Nearly 88% of the annual rainfall is received during a brief monsoon spell lasting about three months. Therefore, heavy erosion and high sediment load are the characteristics of the Ganga river system in this area. In contrast to the river Yamuna, the Ganga is shallower but with much faster current velocities, obviously with fewer macrophytes. The other important tributary of Ganga in the district, namely Tons, represents somewhat hill stream features, getting turbulent during monsoon and dwindling into small narrow channel in hot summer months. The ichthyofauna of these feeding rivers is more or less same and no marked difference in the morphometry of fishes inhabiting these ecologically different rivers is visible, probably because of intermingling of fish populations and similar breeding stock.

A vast majority of local fishers depend for their livelihood on fisheries of these rivers. The fishermen fishing in and around the riverine stretch of Allahabad dispose their commercial fish catch, through auction for marketing at the two wholesale fish assembly centres situated on the banks of the rivers Ganga (at Mehdauri) and Yamuna (at Sadiapur).

Exhaustive studies on population dynamics of important groups of fishes have been conducted around Allahabad by the Riverine Division of Central Inland Capture Fisheries Research Institute for four decades. A reappraisal of the data on commercial fish catch statistics collected at different local fish marketing centres during the period represent a gradual but steady decline in the total fish catch. During the period 1959-66, the estimated mean annual fish catch around Allahabad stood at 207.17 metric tons, which declined to 129.63 mt. during 1973-81, still further to 124.17 mt. during 1981-89 and to 67.55 mt. during 1989-97. Apart from an alarming declining trend in total fish catch, there has been a perturbing change in the population structure of many important groups of fishes. The fishers of economically important major carp fishes have given way in favour of small sized miscellaneous group of fishes and to some extent large siluroids, especially *Aorichthys seenghala* (Sykes), *A. aor* (Ham.) and *Wallago attu*. In 1960s major carps, with over 40% contribution, especially *Cirrhinus mrigala*, dominated the scene in the total fish catch. In 1970s and '80s, it declined to about 32% as it was mainly replaced by small miscellaneous fishes (42.47%). During the last ten years the percentage share of these small-sized less economically important fishes reached to above 54% of the fishery while carps have dwindled to a level as low as about 12%. Interestingly during 1960s when *Cirrhinus mrigala* dominated the catches with about 23.5% share, *L. calbasu* contributed about 4.5% in the total catch of Allahabad, but by about 1985, the latter started emerging as the principal component of major carp fishery with a contribution of about 14.6%. The scenario did not last for long and large catfishes especially the two species of *Aorichthys*, locally termed as 'Tengra', gradually improved their status with declined catches of other siluroid fishes, viz, *Wallago attu, Pangasius pangasius* and *Silonia silonia*, the last two becoming rare in riverine catches. For the last three decades the average contribution of catfishes has ranged between 18-22% but in nineties it increased significantly to more than 33%, clearly indicating the improving status of siluroid fishes as compared to carps in the fisheries of the river Ganga around Allahabad.

The commissioning of Farakka barrage in 1972 resulted in a deleterious effect on anadromous *Hilsa ilisha*, a clupeid fish of great importance, for the fisheries in Allahabad district. In pre-Farakka period (1955-72), the yield of hilsa at

Allahabad varied from 7.87 to 40.16 tonnes, which drastically declined to 0.13 to 2.04 tonnes in post-1972 period. This is a classic example of deleterious effect of constructing dams/barrages across rivers on the yield of migratory fishes.

Fisheries being an important economic activity, the declined catches from rivers and the changing scenario of catch composition have resulted in multifaceted problems to the local fishermen. This has also resulted in a shift of fishing patterns and gears employed by the local commercial fishermen around Allahabad. During sixties and seventies when hilsa had the major share in riverine catch around Allahabad, Kamel (trapnet) was the dominant gear. After the collapse of hilsa fishery, major carps particularly *Cirrhinus mrigala* dominated the commercial catch. During this period the predominance of dragnet was evident. The declining major carp fishery during seventies and eighties resulted in yet another shift in gear use and fishing pattern. In recent years, dragnet is being gradually replaced by gill-net.

It is difficult to cite any single explanation for upsurge or decline in the population structure of any non-migratory fish species under riverine conditions. Studies at CICFRI have revealed that it is mainly due to habitat loss as a result of a number of man-made changes in the riverine habitat. Heavy siltation of the river bed (due to deforestation) has been found to be the main cause in depletion of fisheries of non-migratory species, both quantitatively and qualitatively. The Ganga river bed from its origin upto Patna has been observed to contain over 95% sand and the average water depth at Allahabad during post monsoon months (months of maximum water availability) has gone down by about 4 m in a 20 year period of 1970-75 to 1990-95. These two have resulted in loss of feeding as well as breeding grounds of quality fishes. River course modification (Farakka barrage) is an added factor, which has drastically effected the upward migration of hilsa and, thus, its fishery. Sizable reduction in availability of quality fishes of desired size forced the fishers to adopt irrational fishing practices (mostly aimed at juvenile fishes) which has been further detrimental to the population structure and recruitment of fish stocks.

In conclusion, it may be mentioned that man-made environmental perturbations have led to the decline of yester year lucrative fisheries of hilsa and other economically important fishes. Conservation of original fish germplasm, available in rivers, is essential for aquaculture as the broodstock requires periodical changes to overcome genetic deterioration due to inbreeding. Further, from socio-economic point of view as well, a healthy riverine fisheries are needed specially for the welfare of fishers inhabiting the area as well as for the fish-eating populace in general.

Corporation for Management of Kerala Fishing Harbour

There are five fishing harbours in Kerala. Of these, the one at Cochin is being managed by Cochin Port Trust, the remaining four harbours located at Munambam, Shaktikulangara, Beypore and Puthiappa, are now being auctioned for management, on annual basis, to the highest bidder.

In a memorandum submitted to the State Fisheries Minister, Prof. K.V. Thomas, the Seafood Exporters Association of Kerala region has pointed out that the maintenance of these harbour was highly deficient. Sanitation and hygiene were not at all taken care of in all four harbours that were being auctioned. Emphasising the urgency of maintaining strict hygienic and sanitary standard at the harbours, and at pre-processing facilities, ice plants, seafood factories and cold storages, in the particular context of the insistence there of by importing countries that only such products manufactured in conditions of high sanitary and hygienic standards should be supplied to them, the Association has appealed to the State Government to create a Corporation for the management of five major fishing harbours in the State.

The Indian seafood industry has taken to upgradation of pre-processing and factory facilities to meet the new international standards in order to sustain the exports, and as these could be sustained only by ensuring hygienic standards in the harbours and at the plants..

There are now 97 EU-approved plants in the country of which 47 are in Kerala.

The seafood processing plants in the country are subject to severe monitoring and testing for microbiological standards stipulated by the importing countries. However, in spite of rigorous quality control measures, now and then, shipments of Indian seafood products are being rejected by the health authorities in the importing countries on the ground that they fail to meet the required microbiological standards. Authorities have assessed that product contamination started from the fishing vessel itself and extended to landing centres and fishing harbours. In this situation, it is stated that the only way to ensure the maintenance of sanitation and hygiene and the upgradation of the facilities at the harbours is to bring them under a Corporation, the Association said.

The Association said that the proposed independent Corporation should have equity participation, to a small extent by MPEDA, Seafood Exporters Association and Trawler Owners Association with the State Government having the majority stake. The Board of Directors of the Corporation, with representation from all the stake-holders, will be fully responsible for administering the harbours it is stated.

The Association has recalled that the required funds can be mobilised as grants both from the Ministry of Commerce and the Ministry for Food Processing. The Ministry of Commerce in particular is stated to be very keen to improve the conditions of the landing centres and fishing harbours and the Corporation could approach it for assistance, it is added.

Reduction of By-catch through Square-meshed trawl cod-end : Popularisation in Gujarat

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There are about 6500 small and medium sized trawlers in Gujarat, some engaged in daily fishing trips and some in multiday fishing activity, covering 8-10 days at a stretch. The boats operate two seam bottom trawls with head rope size ranging from 25 to 35m for catching fish and shellfish at a depth range of 20 to 200 m. The net is made of HDPE webbing of 1.5-2.5 mm dia. The mesh size in the fore part of the net varies from 80-800 mm, whereas the codend mesh size is only 10-15 mm.

Because of the small size of meshes in the trawl codend, on an average 0.8 to 1.5 t of by-catch is landed per boat, per trip, during the entire fishing season. Juveniles of fishes, crustaceans, molluscs and other aquatic organisms are the major components of by-catch. Fishermen sell this by-catch to the fish meal plants at the rate Rs. 1 to 2/kg. Since there is a demand for by-catch, the practice is continued. This indiscriminate fishing method has adversely affected the growth and recruitment of the resources and that is the major reason for depletion of catch from the coastal waters of Gujarat, during the past two years.

Ever since its inception, Central Institute of Fisheries Technology has been cautioning the fishermen to increase the trawl condend mesh size to 30-35 mm, in order to eliminate capture of juvenile fishes for conserving the resources. While there has been a significant increase in the mesh size of the fore parts of the net, the codend mesh size remained as 10-15 mm, despite the cautionary exhortation.

During last fishing season the Fisheries Commissioner of Gujarat state issued an order directing the stake holders to increase mesh size of codend to positively by 30th April 2000, which was publicised widely among fishermen, boat owners and net makers of Gujarat. Strict punishment measures such as withholding creek pass and stopping subsidies on fuel, etc., were included in the order. However, only a few of the fishermen have adopted 35 mm mesh size for the codend.

Even these few carry the old 10 mm mesh codend, apparently for using it, instead of the 35 mm meshed codend, once they are at an undetectable distance from the harbour/landing point. There are some who deliberately discontinued the use of the 35 mm codend, fearing loss of shrimp catch.

Another problem associated with mesh size regulation is the legal inability of the State fisheries department or any other State agency to check the mesh size and impose fine for not implementing the mesh size regulation. The only possible way of popularising 35 mm meshed cod end is to educate and convince the fishermen about the consequences of the present practice they follow.

The opening of the conventional diamond-shaped mesh used in the trawl net decreases considerably during trawling, due to the load as well as water flow, which prevent the escapement of juveniles and small fishes. To tackle this problem CIFT has taken up comparative bottom trawl fishing experiments, some with nets having diamond mesh codend and some with square-meshed codend attachment. The experiments proved the superiority of square mesh over diamond mesh in facilitating escapement of juvenile fish (Kunjipalu *et al.*, 1989, 1994 & 1996).

The square mesh panels were prepared from the diamond mesh ready made

35 mm mesh size codend of a demersal trawl net at Veraval Fishing Harbour

Juveniles of prawns and fishes that escaped through 35mm square mesh codend

webbing available in the market, by cutting and re-joining the pieces. The fabrication is simple and webbing required for fabrication of a square mesh codend is less than that of conventional diamond mesh codend. Nylon webbing with 10 mm mesh size was used as cover for both types of codends to retain the juvenile fishes escaping through the net. The codends were rigged to two 32m large mesh trawls and operated during two fishing seasons at Veraval.

In general, the escapement of juvenile of fish and shellfish was almost double through the square mesh codend when compared with the conventional diamond mesh codend. This is because the size (opening) of the square mesh remains almost constant throughout the fishing operation, irrespective of the load.

For popularising square mesh codend in Gujarat, Veraval Research Centre of CIFT organised a training programme on square mesh codend fabrication, with a view to equipping the fishermen to gradually take to the use of square mesh codend and popularising the same among them. Several fishermen, boat owners and net makers participated in the programme. Tailoring of ready made square-meshed webbing into panels, joining the panels to achieve square shapes for the mesh and fabrication of codends were demonstrated to the fishermen. The Scientist-in-charge of CIFT and representatives of other organisations appealed to the fishermen to adopt 35 mm square mesh trawl codend for by-catch reduction and fishery resource conservation.

Several fishermen agreed to adopt the technology. At the same time they expressed the need for some financial assistance from the State Government. As per the proposal made by CIFT, the Commissioner of Fisheries of Gujarat State has released some amount to CIFT for organising similar programmes at major landing centres of Gujarat and also for fabricating and distributing square mesh trawl codends for the sustainable fisheries development of the State.

It is suggested that the following measures may be instituted on priority basis, so as to effectively ensure the implementation of mesh size regulation and management of fishery resources:

1. Since the total number of fishing units is very high, no more fishing boats should be allowed to be added to the fleet;
2. Thr State Government may take initiatives to provide legal backing to ensure the mesh size regulation;
3. Square mesh trawl codend developed by CIFT may be popularised for by-catch reduction;
4. Supply of trawl net webbing with mesh size less than 35 mm may be banned;
5. All boats may be inspected and in that light it may be ensured that all of them have trawls with codend of square meshes not less than 35 mm;
6. Necessary instructions may be issued to the net manufacturing companies for supplying HDPE webbing made of twines with 2-2.5 mm dia., and 35-40 mm square mesh size for the trawl codend;
7. All net supplying outlets may be inspected and webbing with less than 35 mm mesh size may be confiscated;
8. Various State and Central Government agencies may formulate co-ordinated strategies for management of fishery resources through implementation of mesh regulation system; and
9. The State Fisheries Department may organise awareness programmes on conservation and management of fishery resources and net selectivity at different centres of Gujarat from time to time.

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Dr. D. Sudarsan, Reputed Marine Fishery Scientist, Passes Away

Dr. D. Sudarsan

Fishing Chimes mourns to report the sudden demise of Dr. D. Sudarsan, Director General (Retd.), Fishery Survey of India, and a reputed marine fisheries scientist. He left the mortal world plunging his family members, and a large number of his colleagues and friends in the fishery sector in deep sorrow.

He succumbed to massive brain haemorrhage. He was admitted into a nursing home in Visakhapatnam on 24 October evening and the end came on 28 October . He has left behind his wife, two sons and a daughter and a large number of relatives and professional colleagues.

Dr. Sudarsan's contributions to marine fisheries sector of India live in legend and song. It was under his leadership shrimp grounds of the sandheads zone were located. This had eventually led to a flourishing commercial shrimp fishery. He provided a fillip to the location of tuna grounds and oceanic resources of Indian EEZ. He established that fisheries resources of the eastern part of the Indian EEZ are no less than the western part of it.

May Almighty bless him with *Atma Shanti*.

Tamilnadu enhances seasonal relief to fishermen

It is reported that the Tamil Nadu Government has enhanced the quantum of relief to fishermen paid during non-fishing season by Rs.120, bringing it to Rs.1,200. Besides the monetary relief, each fishermen would also be given 40 kg of rice during the non-fishing season, according to the report.

Further, it is learnt that the State Government had also decided to build 20,000 houses for the fishermen, of which 1,000 will be for inland fishermen. 300 lavatories for those living in seashore villages will also be provided.

Studies on Coastal Management and Shrimp Disease Control with Tech Assistance of MPEDA-NACA

Stated generally, shrimp farming is a highly successful developing activity in India. The development of the activity in the state of Andhra Pradesh is far ahead to compared to the other coastal states.

The spectacular growth of shrimp aquaculture could be achieved through the efforts of several organizations like the MPEDA, other Govt. agencies, financial institutions and the enthusiastic entrepreneurship of the farmers. It has been estimated that aquacultured shrimp presently contributes to about 84% of exports of shrimps from India. The shrimp culture activities all along the Indian coastline have helped in poverty alleviation and improvement of quality of life in rural sector.

A disquieting turn in the progress of the culture sector took place at the end of 1994. At this time, shrimp aquaculture sector encountered several problems, the foremost being the repeated WSSV disease outbreak in shrimp farms which had led to heavy production losses. This sector has also been under severe criticism from several agencies, mainly highlighting some of the negative impacts, especially the environmental issues.

On an average, Indian shrimp aquaculture sector loses around Rs.400 to Rs.500 crores annually due to disease outbreak. Though several remedies have been advocated by various technical experts/agencies for control of the disease, the causative factor for its outbreak could not as yet be conclusively determined.

In order to sustain shrimp aquaculture sector in an environment friendly manner as a production enterprise and to contain the disease outbreak, a detailed study on various issues is being undertaken by MPEDA, in association with Network of Aquaculture Centre in Asia-Pacific (NACA), Bangkok, Thailand, which is an international ogranization for receiving technical assistance on control of shrimp diseases and also for drawng up and implementing coastal management plan in India. The objectives of the study are (a) to undertake a study of shrimp diseases in the selected shrimp farming areas; (b) to develop practical measures for containing or preventing shrimp disease outbreaks; (c) to conduct training and to demonstrate appropriate shrimp disease control measures and better farm management practices; and (d) to examine opportunities for cooperation and self-help among shrimp farmers in affected areas to control water quality deterioration and shrimp disease control.

The study is being implemented in three separate phases extending from August 2000 until July 2002. The preliminary phase was completed in December 2000. It involved collection of background information on the shrimp disease situation along the east coast of India. The second phase started in January 2001. Under this, a detailed study of shrimp farming areas in three zones, one in Tamil Nadu, and two in Andhra Pradesh is now in progress. Based on the study findings, the third phase extending over 6 months in 2002 will be taken up to provide training support, and demonstration of appropriate shrimp disease control measures, and better farm management practices.

NACA has an extensive network of experts and institutions working on shrimp health management and coastal aquaculture in the Asian region.

The NACA mission came to India during the end of August 2000 and visited the various shrimp farms and hatcheries and discussed with farmers and hatchery operators about the disease problem along the east coast of India covering Andhra Pradesh and Tamilnadu. The team initially formulated a work plan for the base line survey to identify the major shrimp diseases and study management measures being followed through consultation with farmers at selected creek and drain based farming areas of Andhra Pradesh and Sea based farms in Tamilnadu. Accordingly, a study was carried out and the base line data collected by MPEDA from 105 shrimp farms located along the Kandaleru creek of Nellore District of Andhra Pradesh, 124 small scale farms in Bhimavaram region of A.P. and 4 nos. of shrimp farms located along the coast (sea based) in Tamilnadu during the months September and October 2000, in order to identify the risk factors.

Later, findings from preliminary survey were discussed during the workshop held at Chennai during October end / November 2000 with the technical personnel of MPEDA, NACA consultants, resource personnel from College of Fisheries, Mangalore, and Central Institute of Brackishwater Aquaculture (CIBA). The discussions covered major shrimp disease issues, and strategies to deal with disease problems. The major disease problems identified were White Spot Virus, Loose shell and Vibriosis in addition to several minor ones. The workshop has listed out various risk factors and practical measures to design the epidemiological study in selected farming areas.

In the second phase of the study, a workshop was conducted during early January 2001 at Nellore to formulate a design for the detailed study to identify the major risk factors related to key diseases and practices for management.

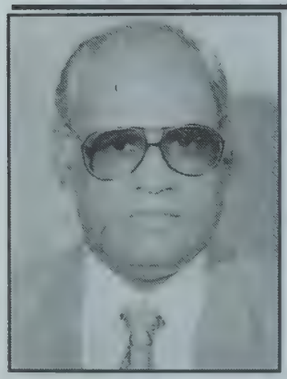
Detailed operation manual and different formats were prepared at the workshop the study programme was delineated. Various data on physical parameters analysis of seed samples through PCR to determine the prevalence of WSS virus, and histopathological studies for MBV, besides daily and weekly observations of the ponds, are being collected.

The environmental data of the source of water and other parameters are also being gathered. The data thus collected from the various farmers are being compiled.

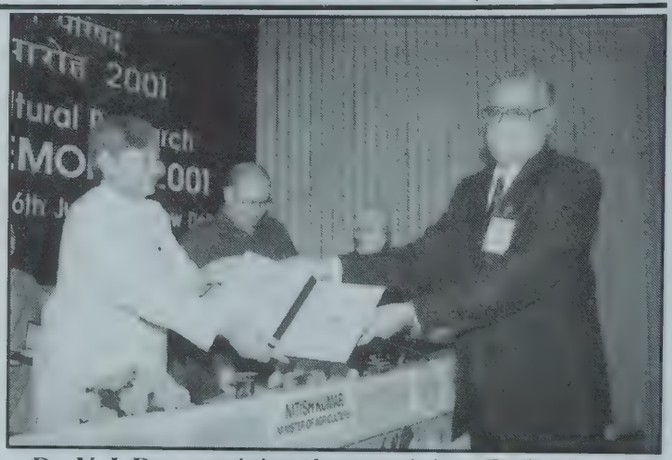
The third phase of this excercise will be worked out later in 2001, but the emphasis will be on testing, demonstration and dissemination of the study findings to farmers. It is anticipated that special attention during this phase will be given to training activities, site based workshops to present study results to farmers and local authorities, working closely with small farm groups in selected locations and by development of extension materials and preparing study reports.

A close relation will be maintained between this study and other relevant regional programmes of NACA. These include the Asia Regional Aquatic Animal Health Programme, the consortium programme on shrimp farming and the environment, and support to member countries in the implementation of the FAO Code of Conduct for Responsible Fisheries.

Kidwai Award 1999-2000 Conferred on K.J. Rao



K.J. Rao



Dr. K.J. Rao receiving the prestigious Rafi Ahmed Kidwai Award from Mr. Nitish Kumar, Honourable Union Agriculture Minister at the time.

The Rafi Ahmed Kidwai Award for outstanding agriculture research for the biennium 1999-2000 has been conferred on Dr. K.J. Rao, Principal Scientist, Central Institute of Freshwater Aquaculture, Bhubaneswar, for his significant research contribution in the field of freshwater prawn culture. The citation says that his contributions "have provided excellent opportunities to transform farm activity plagued with uncertain growth stages and erratic yield to a scientifically sound, technically viable, sustainable and ecofriendly farmers' practices with immense potential".

Dr. Rao has received the award on 16-7-2001 in New Delhi from the hands of Mr. Nitesh Kumar, Union Agriculture Minister at that time. The technology developed by Dr. Rao has now been disseminated among farmers, technologists scientists and enterpreneurs. The technology is spreading fast as a national aquaculture activity. Around 50,000 ha of water area is now stated to have been brought under freshwater prawn culture in the country.

A freshwater prawn complex with hatchery, farm and feed mill has been developed by him as a National Facility at CIFA. The hatchery technology incorporates two phase rearing, employing a closed recirculatory system and formulation of inexpensive eco-friendly viable diets for larvae, post-larvae, grow-outs and broodstock of giant freshwater prawn *Macrobrachium rosenbergii*.

Dr. Rao has undertaken a comprehensive survey on the present status of hatchery and grow-out culture of freshwater prawn in the country. He has also prepared strategies for the sustained development of freshwater prawn culture in different agro culture regions of the country.

Marine exports to U.S. up by 10 p.c.

Marine exports to the United States have increased by about 10 per cent during the first quarter of this year, despite nosediving of prices by over 30 per cent in the international markets during February.

In terms of quantity, the country's exports had increased by 25 per cent, though monetary realisation was down by 3.5 per cent. Any reference to delayed confirmation and refusal of consignments were more for price re-negotiation rather than cancellation, it is stated.

The price slash in the international market had been attributed to a combination of factors, of which, the general slow down of economy in Japan and US was a prime cause. Prices had gone up last year due to disease, curbing exports from Ecuador. However, India recorded an all ltime high of $1.43 billion with a 'volume' of 4.40 lakh tonnes during 2000-2001. Shrimp alone accounted for nearly 60 per cent of the value.

On the export front, the shares of inland and marine produce were almost equal, though during the last two decades shrimp production had grown by 125 per cent and the trade by 200 to 300 per cent.

The President of the Seafood Exporters Association, Mr. Elias Sait, is reported to have said the export scenario was bleak at the present juncture. Both exporters and fishermen had to work on cost reduction for survival. Fishermen in Andhra Pradesh and Gujarat had dropped anchor due to the crisis. About 1.50 lakh hectares in the country were under aquaculture and the sector required a stable price line for sustainable operation. The proposed re-classification of imports under 'sensitive' and 'non-sensitive' by European countries would further harm the industry, as import duty there would double from the 4.2 per cent to 8.50 per cent for raw and from eight to 16 per cent for value added products, he is reported to have said.

Fishermen were more likely to face the impact of the sluggish market trend than the organised sector, Ms. Neerja Rajkumar, Union Joint Secretary, (Fisheries) is reported to have said.

Technology Transfer to Fisherfolk: CIFT's Visakha Centre launches Programme.

Under its Technology Transfer Programme, the Visakhapatnam Research Centre of CIFT has adopted a fishing hamlet of Visakhapatnam (Peddajalaripeta) for upgrading the capabilities of fishermen by way of imparting skills for securing better catches, and for hygienic handling of catches, their processing and marketing.

The programme was inaugurated in the village by Prof(Dr) P. Varalakshmi, M.L.A, Visakhapatnam, in the presence of Ms. Y.Sunanda, Assistant Project Officer, District Rural Development Agency, Visakhapatnam, Mr. M. Appa Rao Reddy, Corporator, Visakhapatnam Municipal Corporation, Mr. T. Bhooloka, President and Mr. T. Munithatha, Vice President, of Peddajalaripeta Village, and Dr. K. Devadasan, Director, Central Institute of Fisheries Technology, Cochin, Dr. Mohan Joseph Modayil, Director, Central Marine Fisheries Research Institute, Cochin. Dr. Krishna Srinath, Head of Extension Services Division of CIFT, Cochin, and the scientists of the Research Centre, Visakhapatnam, Dr. S.S. Gupta(Scientist in-charge), Dr. D.J. Khasim, Principal Scientist, and Dr. G. Rajeswari, Scientist participated.

The inauguration took place on 18th October 2001 in the foreground of Rama Temple in the village. Y. Sunanda advised the villagers to form themselves into groups for obtaining the needed assistance and benefits of the various development programmes. She also spoke inspiringly on the importance of maintaining hygienic and sanitary conditions in the village and also in respect of the fish landed. She advised them to avail of the benefits of the technology transfer programme to be implemented in their village by CIFT's, Visakhapatnam centre for a duration of six months from now on. By doing so, they would be able to secure better prices for there products. They should learn from CIFT the technology systems to be followed for hygienic and attractive packing of fish products of sun dried/salted fish products. When these improved systems were adopted they would obtain better prices. She also said that common facilities for solar and other ways of drying of their products for there own benefit should be developed. The fisheries departmental officials and CIFT's regional centre would be able to assist in this regard.

Prof. (Dr.) P. Varalakshmi, in her inaugural address, exhorted the fisherfolk to utilise the facilities under various programmes of the State and Central Governments with the objective of upgrading their economic position and living standards. She called upon the fisherfolk to educate their children, adding that education would equip them to understand improved technologies and adopting them for their own economic development. She also suggested the establishment of a solar drying plant in the village as a common facility.

Dr. K. Devadasan who presided over the function, highlighted the importance of the programme. He said that the Central Institute of Fisheries Technology had launched a special component plan for empowerment of fishermen and women. This programme was being implemented in different parts of the country by the research centres of the institute. The plan was part of the IX Five Year Plan and it focused on imparting training and technical know how in fishing, fish processing, handling and hygiene for the fisherfolk. In order to improve the quality of fish and fish products, hygiene and sanitation in fish handling at grass roots would have to be improved and the fisherfolk needed to be equipped with the required knowledge and skills. He said that Peddajalaripeta Village was one of the villages selected by CIFT for technology transfer and upliftment of fisherfolk. the programme primarily aimed at development of skills among fisherwomen who have an important role in fish handling and marketing. It would deal with subjects like hygienic handling of fish, rack drying, use of ice and other preservation methods, preparation of value-added products, fishing craft protection methods, gear fabrication, eco-friendly waste disposal and environmental improvement. The programme would be integrated with health, nutrition, literacy and welfare activities with the help of other Research Institutes and development departments. Group activity by fisherfolk, particularly by fishery women would be promoted.

Dr. Krishna Srikanth, Head, Extension Division of Central Institute of Fisheries Technology, Cochin, addressing the participating fisherfolk said that the institute had adopted their village for equipping them with improved technologies of fishing, and post-harvest technologies including marketing for the duration of six months and she exhorted them to derive full benefit out of the programme, through enthusiatic and purposeful participation. She said that the institute would do its utmost to see that they were well equipped with an upgraded professional calibre. Earlier, Dr. Khaseem, Principal Scientist of CIFT welcomed the gathering.

Heavy floods in South A.P. cause severe culture shrimp losses

Heavy floods that ravaged south A.P. resulted in severe culture shrimp losses due to breaching of bunds and overflowing of waters. It is learnt that MPEDA is now engaged in estimation of losses. It is feared that this production may have a serious dent on exports.

Nirja Rajkumar IAS : Joint Secretary (Fisheries)

Ms. Nirja Rajkumar IAS has taken over as Joint Secretary (Fisheries) in Sept 2001, in the place of Ms. Nita Chowdhuri IAS, who took over as Joint Secretary (Animal Husbandry).

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UltraZyme-P-FS

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* TRADE MARK

Book Review

Sewage Fed Aquaculture

Author: N.M. Chakrabarty
Principal Scientist
Peninsular Aquaculture Division
Central Institute of Freshwater Aquaculture
Hessarghatta Lake P.O.
Bangalore 560 089

This book is a compendium of information on various aspects Sewage Fed Aquaculture, a system hitherto confined to West Bengal but which is now being increasingly recognised as a major culture system of importance as it would enable the utilisation of Sewage as a fertilising component for augmenting fish production after subjecting it the needed treatment to adjust various parameters such as pH, dissolved oxygen, Ammonia etc., to conducive levels. While yielding good fish production per ha, the system has been found to bring down running expenses substantially. In other words, Sewage Fed Aquaculture is a low-input and economically viable technology which can be widely applied in such of the urban areas where it will be possible to take treated sewage into fish ponds in order to boost fish yields. The book is a valuable guide to those interested in taking up sewage fed fish culture.

Dr. N.M.Chakrabarty, author of the book is a Fishery Scientist with wide experience in culture fisheries sector. He started his research career at the Central Inland Fisheries Research Institute, Barrackpore in 1975. He has made immense contributions to culture fishery development of Indian major carps and also fresh water prawns. His crowning glory however was his achievements in respect of carp culture in sewage fed ponds.

Fisherfolk in Deep Straits

Dwindling catches off A.P. Coast and consequential loss of livelihood has pushed many fishermen into criminal activities and fisherwomen into prostitution, according to Venkatesh Salagrama, Director, Integrated Coastal Management, Kakinada, A.P.

Presenting his paper at the five-day seminar on 'Forging Unity: Coastal Communities and The Indian Ocean's Future', conducted by South Indian Federation of Fishermen's Societies, Venkatesh is reported to have said that undirected fishing operations had been victimising fishing villages.

Mechanised boats hardly fish beyond five nautical miles from the shore and use nets with mesh sizes less than 10 mm, often competing with traditional boats, robbing smaller fishermen of their livelihood.

Pollution of coastal waters of north Andhra Coast by effluents released by aquaculture farms, industrial, activities and ecological distrubances having deprived fishermen of the coast of their normal fishery wealth, fishermen of the area had to migrate enmasse from North Andhra (Srikakulam district) to Gujarat to work in trawlers, it was mentioned.

Wild tiger shrimp seed collection along A.P. coast became rampant for selling seed to shrimp farmers for stocking their ponds. Despite being told that this was a banned activity, fishermen continued with it, as alternative means of livelihood were hard to come by, Venkatesh explained.

According to him, the worst hit were fisherwomen, as they were displaced from the traditional processing-marketing scene. Unemployment levels among them became so high that fisherwomen were forced to choose the option of prostitution to make ends meet, he observed.

In Tamilnadu, the depletion of marine wealth in the northern region had pushed fishermen to seek their fortunes elsewhere, especially in the Gulf of Mannar, it was mentioned.

V. Vivekanandan, Chief Executive, South Indian Federation of Fishermen's Societies, Thiruvananthapuram, observed in his presentation that fishing vessels from Rameswaram strayed in large numbers into Sri Lankan waters because of proximity to the International Boundary Line. The accompanying factor was the harassment of Tamilnadu fishermen by the Srilankan Navy. 176 incidents occurred between 1983-2000 in which 85 were killed, 276 injured, and 14 went missing. Over 250 were arrested, he added.

Vivekanandan said that a similar problem dogged the Indo-Pak border as well. While India and Srilanka had a fishing treaty and a good measure of understanding of each others position, the problem with Pakistan had been different. Representatives from Pakistan had been pointing out the border between Indian and Pakistan in the Sir and Kori Creeks had not been delineated. Though the issue figured in the Foreign Ministers' working group meetings, a decision had not been forthcoming because of the vitiated political atmosphere, he told the gathering.

An imaginary line had been drawn off the baseline and the coast guard personnel often trespassed into the other's areas to arrest fishermen. It became a routine practice for India and Pakistan to arrest fishermen of the other side on a regular basis, followed by periodic exchanges.

Gujarat Newsletter

From **K.R. Narayanan**

Business-cum-Operators Meet at Veraval

A Joint Business-cum-Operators Meet was organized at Veraval on 14 September, 2001. The Meet was sponsored by Gujarat's Apex Fisheries Co-operative (Gujarat Fisheries Central Co-operative Association Limited, Ahmedabad) along with Messrs. Ashok Leyland Ltd., Chennai.

The objective of the Meet was to create awareness among the fishery operators about the cost effectiveness of installation of Ashok Leyland Marine Diesel Engines in marine fishing vessels that conduct fishing operations along the coast. The interaction between the manufacturers and the fishermen of Gujarat highlighted the advantage of the new engines, over those assembled from the old/ scrapped auto engines.

fisheries sector, like the FRP fishing boats, fishing nets, outboard and inboard Motors and their spare-parts, were displayed.

The Meet was inaugurated and presided over by Mr. K. Soman, Managing Director of the GFCCA. Mr. Antony Lobo, Senior Manager of M/s. Ashok Leyland Ltd., Chennai, spoke on the advantages of Leyland engine and its contribution to the marine fisheries development of Gujarat State. About 400 fishermen who participated took full advantage of the Meet and the Exhibition of the products of the GFCCA, Ashok Leyland, Indian Oil Corporation and the MICO.

A View of the Podium and Major Participants.

The GFCCA's stall in the exhibition.

Inauguration of the meet by Mr. K. Soman, Managing Director, GFCCA, Ahmedabad. Along with him is Mr. Antony Loboof M/s. Ashok Leyland, Chennai

The GFCCA's engine/motor stall in the exhibition.

A view of the participants

The Directors of the GFCCA, the Gnath Patels (Leaders) of the Fishing Community, and the fishermen of Veraval, the President and members of the Boat Owners' Association, Veraval, the representatives of the Indian Oil Corporation, the officers of the State Fisheries Commissionerate at Veraval, etc. participated in the Meet.

One of the highlights of the Meet was an Exhibition organized by the GFCCA, wherein the fishing implements, manufactured/provided by the GFCCA to the

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Jharkhand Newsletter

From A.K. Singh

The fisheries activities of Jharkhand State, which was carved out of Bihar, have now become stabilised under a separate Fisheries Department headed by a Regional Director. The names of the Regional Director and Deputy Directors and officers in the districts are given hereunder.

Regional Director, Ranchi	-	Mr.Rajeev Kumar
Deputy Director, Ranchi	-	Mr.Ashish Kumar
Deputy Director, Hazaribagh	-	Mr.Yegendra Kumar Madhup

District Fisheries Officer cum Chief Executive Officers, FFDA

Ranchi	-	Ashish Kumar
Gumla	-	Ashok Kumar Singh
Lohardaga	-	Manoj Kumar Singh
Palamu	-	Satrudhan Prasad Singh
Garhwa	-	Iqbal Ansari
Tatanagar	-	Binod Kumar Singh
Chaibasa	-	Radhika Raman Prabhakar
Hazaribagh	-	Ravi Shanker
Chatra	-	Umesh Prasad Singh
Giridih	-	Amrendra Kumar
Dhanbad	-	Pramod Kumar Yadav
Bokaro	-	Manoj Kumar
Deoghar	-	Shambhu Prasad Yadav
Dumka	-	Ishwar Singh
Sahebganj	-	Ram sewak Paswan
Godda	-	Sanjay Kumar Gupta

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The president of the Seafood Exporters Association, Mr. Elias Sait, is reported to have said the export scenario was bleak at the present juncture. Both exporters and fishermen had been placed in a position to work on cost reduction for survival. Fishermen in Andhra Pradesh and Gujarat had already dropped anchor due to the crisis. About 1.50 lakh ha in the country were under aquaculture and the sector required a stable price line for sustainable operation. The proposed re-classification of imports under 'sensitive' and 'non-sensitive' categories by European countries would further harm the industry, as import duty there would double from the 4.2 per cent to 8.50 per cent for raw and from eight to 16 per cent for value added products, he is reported to have said.

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Tune 2002

7th Infofish World Tuna Trade Conference

29-31 May, 2002, Kuala Lumpur, Malaysia

The above mentioned conference, is organised by IFOFISH, in associated with FAO-GLOBEFISH, Indian Ocean Tuna Commission, Ministry of Agriculture, Malaysia and also in collaboration with the Department of Fisheries, Malaysia and Fisheries Development Authority of Malaysia. The event will focus on 1) Global Tuna Resources, supply trends; 2) The WTPO and voluntary global cutbacks in fishing efforts; 3) Trends and changes in the Japanese sashimi tuna market; 4) Market reviews on canned and non-canned tuna products; 5) Latest records in the USA for lightmeat, white meat canned tuna and tuna products; 6) The future of canned tuna in Asia; 7) EU markets: demand and supply of canned tuna from the ACP and non-ACP countries; 8) Product development and new markets 9) Tuna trade through dotcom; 10) Seafood safety issues affecting consumption and imports; 11) Environmental issues including Eco-labeling and 12) Other topics of specific and general interest.

Further details on Tuna 2002 may be obtained from:

INFOFISH
PO Box 10899
50728 Kuala Lumpur
Malaysia
Fax: 603-2691 6804
Email: infish@po.jaring.my
infish@tm.net.my

Karnataka Newsletter

From **H.N. Chandrasekhariah**

Fisheries Directorate to be shifted to Mangalore

The Chief Minister of Karnataka announced in the State Assembly that the Directorate of Fisheries, now located in Bangalore, would be soon shifted to Mangalore. There is considerable resentment over this decision, particularly in the non-coastal parts of the State. The inland fishermen feel that Bangalore is much more central to them and inland fisheries being a comparatively less developed sector, they are entitled to the retention of the Directorate in Bangalore itself. Their economic status being comparatively far below the level of the marine fishermen, it would be a hardship for them to travel all the way to Mangalore to represent their grievances to the Government.

It is learnt that some Members of the Legislative Assembly have also written to the Chief Minister to retain the fishery Diretorate at Bangalore itself.

Finance Sub-committee recommends priority to Inland Fisheries Department

The Finance Sub Committee set up by the Karnataka Assembly to look into and recommend financial outlays needed for the departments of agriculture and allied subjects, recommended the allotment of substantial funds for inland fishery development, while also calling upon the government to accord top priority to inland fisheries development. The Sub Committee was headed by Mr. C.V.Byregowda, M.L.A.

Further, favouring an integrated approach, the Sub-committee recommended the expansion of the infrastructure and also the intensification of the present efforts at producing fast growing varieties of fish seed for stocking purpose. The Sub-committee felt tht the annual fish production of the State should be raised to 4.00 lakh tons as against the present annual production of 1.25 lakh tons.

The Committee had also suggested the shifting of the headquarters of the Project Director of Malpe and Hannovar harbours to Mangalore and to provide enhanced powers to the Project Director to implement the marine fishery developmental schemes related to the three coastal districts instead of shifting the Directorate of Fisheries to Mangalore. The Committee was of the strong view that a balanced development of marine and inland fisheries of the State could be achieved by retaining the directorate of fisheries in Bangalore and simultaneously shifting the Project Directorate of Malpe and Hannovar harbours to Mangalore with enhanced powers to undertake marine fisheries development in the three coastal districts. The location of the Project Directorate's office in Mangalore would provide a fillip for expansion of processing, internal marketing and export facilities and also for organising the construction of additional fish landing facilities, link roads, etc., to enable the fishermen to earn remunerative prices for their landings.

ICAR Junior Fellowships to final year students of College of Fisheries, Mangalore.

The College of Fisheries, Mangalore has earned the distinction of having 24 of its BFSc/MFSc final year students coming out in flying colours at the competitive examinations for award of Junior Fellowship conducted by the ICAR. These junior fellowship holders are now eligible for conducting research at any of the 12 ICAR Fisheries Research Institutions in India. The following are the students who have earned eligibility for the junior fellowships: P.K.Deepak, B.T.Rajesh, B.K.Prakash, Y.Sona, Deepesh Debanath, Raj Naresh Gopal, P.I.Ayyappa, J.S.Sushma, Shekeeb-ur Rahman, Binod Kumar Choudhry;, K.P.Kumarnaik, Rajeev Kumar, K.B.Ashalatha, Honnanand, Raghavan and MurphyBam, Sanathan Sheeri, Gunnimaladevi, Natarajan Tikri, Shymalachandra, Shukladass, V.C.Peddanna, P.Vanitha and Nayar Shravanan.

AQUA FEST 2001

The fourth annual exhibition of ornamental fishes was conducted at the Government Aquarium, Cubbon Park, Bangalore from 18-22 May 2001. This was organised by the Aquarists Society of Karnataka in association of the State Department of Fisheries, Karnataka. The exhibition was inaugurated by Mr. Abhijit Sengupta, Principal Secretary to Government, Animal Husbandry and Fisheries Department. Mr.D.M.A.Hameed, Director of Fisheries and exofficio President of the Aquarists Society of Karnataka was the Chief Guest.

In his inaugural speech, the Secretary complimented all the Hobbyists who had set up their stalls and exhibited various varieties of aquarium fishes. He commended the efforts of the stall owners for taking special interest in setting up aquaria in a highly attractive manner and enabling the visitors to observe the use of modern aquarium gadgets in action. He was particularly delighted to know that the department of fisheries was implementing a scheme for women aimed at popularisation of ornamental fish breeding and marketing. He was confident that more and more women would come forward to avail of the facilities provided in the scheme. Mr. D.M.A.Hameed, Director of Fisheries had suggested to the Aquarists Society to organise ornamental fish shows in Schools and Colleges for popuplarising the hobby and this suggestion was very well received.

Eighteen commercial ornamental fish dealers and 15 hobbyists had displayed 100 different varieties of ornamental fishes. The display of 16 varieties of Gold fishes by the Aquarist Society was the main attraction at the show. Altogether around 15,000 persons visited the Exhibition. Several of the visitors availed of the occasion to purchase aquarium tanks and accessories and also the ornamental fishes put on sale at some of the stalls.

Special prizes were distributed to hobbyists, (children, women and men) and also to the exhibitors.

Mass Mortality of Mahseer (*Tor khudree*)

Mass mortality of Mahseer (*Tor khudree*) took place on 30 March 2001 and on 6 April, 2001 in a fish sanctuary of Bachanayakanahalli near Enekal village located in Sulya Taluk, Dakshina Kannada district. This mortality did not happen because of poisioning, but for other reasons.

The accumulation of left overs of the offerings by the devotees at Kuppu Subramanyeshwara temple at Bachanayakanahalli is reported to have led to the mortality.

The temple is located on a rivulet, a tributory to the river Kumaradhara/ Netravati. There is a pool in the rivulet which is a traditional sanctuary for mahseer, a famous sport fish. There are in fact 12 such sanctuaries in Karnataka on different rivers. Majority of these sanctuaries are located very close to temple complexes. Fishing is totally banned to a distance of one mile above and one mile below the sanctuaries. There are no illegal fishing activities in these sanctuaries. The devotees offer *prasaad* in the form of cooked rice, fried rice, fruits, etc., to the Lord. Similar offerings were made to the fish in the sanctury at Bachanayakanahalli temple complex. On 30 March, 2001 on the occasion of an annual festival, when heavy offerings were made by the devotees and the unconsumed rice and other substances settled down at the bottom of the pool. There was insufficient flow of water and the abnormal accumulations of unconsumed feed in the water is attributed to have led to heavy oxygen depletion resulting in heavy fish mortality of Mahseer. In this sancatury, mahseer of 1.5 to 20 kg. each are reported. It is stated that 1000 of them died within a gap of few hours. They were taken out manually from the water and buried in pits. Even before the burying process was completed, on 6th April, 2001, there was another spell of mortality. This was however attributed to the washing of vehicles in large numbers in the rivulet.

The officers of the State Department of Fisheries and the faculty members of the College of Fisheries, Mangalore, visited the site and collected water samples. Their conclusion was that there was a very heavy depletion of oxygen in the pool, which had led to the mass mortality. It was suggested that steps should be taken to prevent stagnation of water and to create a flow regime from the pool. A general opinion is expressed that the Fisheries Department of Karnataka has a major role to play in ensuring tht such mortalities would not take place in future, particularly at religious centres.

Fish Mortality in Tanks in Mysore District

On 5th and 6th May, 2001 while the sudden down pour of rain in Mysore City and entry of storm water into Ennehole Tank near Mandakalli, Mysore, heavy fish mortality took place in the tank. The loss was estimated at 100 tons, valued at Rs.30.00 lakhs.

Ennehole tank, located adjacent to Mysore City has a waterspread area of 101 ha, with a depth of about 6 m. Under lease to Mysore Taluk Fish Production & Marketing Cooperative Society, fish culture was undertaken by it in the tank during the lease period which lasted upto June 2001. The lease was given by Karnataka Cooperative Fisheries Federation, Mysore. The annual lease amount was Rs.9.60 lakhs. The tank is reported to have been stocked with 19 lakh nos. of major carp seed during 2000-2001. The tank is a perennial one receiving storm water of Mysore City through another tank located in its upper reaches. This tank in the upper reaches, known as Rayanakere tank receives untreated domestic sewage and factory effluents, besides some factory effluents too which are let out directly into Ennehole Tank. It is stated that pollutionary effect caused by these waters has resulted in the heavy mortality.

It is learnt that the Cooperative Society spent around Rs.17.00 lakhs towards payment of the lease amount, cost of fish seed, watch & ward, salaries of staff, etc. The sudden fish mortality has deprived the Society from the anticipated revenue of Rs.35.00 lakhs from sale of 100 t of fishes, estimated for harvest. 200 fishermen who are mainly dependent on the fishery of this tank have become the direct victims of the unexpected development.

Mr. Nanje Gowda, President, Karnataka cooperative Fisheries Federation, Mysore, the Deputy Commissioner, Mysore District and Divisional Commissioner, Mysore Division, and the Director and Deputy Director of Fisheries of the Fisheries Department visited the place and consoled the grieving fishermen and their families. The Deputy Commissioneer, Mysore also visited the site and issued instructions for removing the dead fish and burying them so as to prevent outbreak of any epidemic. The Chief Minister was also informed of the incident and a request was made to release a compensation of Rs.30.00 lakhs to fishermen who were very seriously affected.

In order to prevent incidents of this nature, it is learnt that the Mysore City Municipality has decided to establish a Sewage Treatment Plant (STP) for treating the sewage before entry into Ennehole Tank. The Municipality is understood to have also agreed to supply a few aerators to prevent oxygen depletion in the tank.

Heavy fish mortality also took place in Kukkarahalli Lake, Mysore, for the same reasons as in Ennehole Tank. The entry of untreated seawage into lake is reported to have caused death of a large number of big and small fishes on 2nd August, 2001. This lake, in Mysore University Campus, is on lease to Karnataka Cooperative Fisheries Federation, Mysore, for fishery development. The Federation stocked the lake with two lakhs of major carp fingerlings which are reported to have grown to a weight range of 2-4 kg each. The Mayor of Mysore City, University officials and others visited the lake. Fishermen were told to destroy the fish and to refrain from selling

them to the public. A representation was made to the Mayor to divert the sewage from entering into the lake in order to eliminate mortalities to fish.

Karnataka Pollution Control Board Officials visited the lake and collected water samples for analysis. The State Education Minister Mr. H.Vishvanadh has directed the Deputy Commissioner, Mysore, to submit a report on the Fish Mortality in the lake.

Thousands of fishes were found dead on 2.4.2001 in Dharma Reservoir located near Melagi Dharma Colony, Mundagod Taluk of Uttara Kannada District. This Reservoir has a waterspread area of 800 acres and it was developed by the State Fisheries Department for fish production. It is estimated that around 5.6 tons of fish valued at Rs.2.00 lakhs died on that day.

Fisheries Field Day

Mr. Ramanatha Rai, Minister for Fisheries and Ports, Karnataka, inaugurated the Fishery Field Day at Dilikola Nisargadhama pond near Mangalore on 12.5.2001. This pond, 4 ha. in extent, has been developed by the State Department of Fisheries mainly through stocking it with Catla seed. On this field day, 500 kg. of Catla was caught and sold for about Rs.10,000/- to public. One of the fishes which weighed 7 Kg was reported to have been sold for Rs.500/- in public auction. All the sale proceeds are proposed to be utilised for further developmeent of the fishery of the pond and also the garden around it. It may be mentioned here that fisheries department also maintains an aquarium near the pond.

The function was well attended. Among the partiipating dignataries were Mr. J.R. Lobo, Municipal Commissioner, Mangalore, Mr. Jayaprakash Bhandari, Asst.Commissioner, Mr. V.K.Shetty, Dy. Director of fisheries and several others.

Kerala to set up Fisheries Task Force

The Kerala Chief Minister, Mr. A.K.Antony, said that the State Government would take all necessary steps to restore Kerala's lost glory in the fisheries sector.

One such step was the decision to set up a task force headed by the State Special Secretary (Fisheries), Mr.N.Chandrasekharan Nair, to go into all aspects of the fisheries sector, including its modernisation, quality upgradation to meet export requirements, adoption of scientific fishing methods and development of aquaculture, he explained. It was added that the Committee would suggest short-term and long-term needs of the fisheries sector based on which policy decisions would be taken on a priority basis.

Revision of Kerala Fishing Ban Period sought

The Seafood Exporters Association of India, Kerala region, has appealed to the Chief Minister, Mr A.K. Antony, to undertake a fresh scientific study to determine the proper period for imposing fishing ban in Kerala waters.

The present unscientific method of imposing fishing ban during monsoon period had resulted in the monsoon catches of shrimp being lost to the Kerala fishermen. The main 'Karikadi' season was during the monsoon period and due to the ban, and as shrimp constituted an annual crop, the result was that not only the Kerala fishermen were deprived of the fishery, but no advantages in fishery increase in the long run were being experienced as natural death of shrimps was taking place. Further, the shrimp were found to migrate to waters of adjacent States, it was pointed out.

Locating Schooling Fish from Shore-based Centres

The day is not far away for fishermen press a few keys at special shore centres to know when to leave for fishing and where to find schools of fish.

Such information centres would come up for the benefit of fishing communities in India soon, according to Dr. K Radhakrishnan, Director, Indian National Centre for Ocean Information Services (INCOIS), Hyderabad. It would also be possible to make species-wise forecasts, he added.

The forecasts will be possible due to a string of around 400 floats that would scan the Indian Ocean up to a depth of 2000 metres, he is reported to have said. Data from the floats would be beamed to a satellite and fed into a series of computers in INCOIS that would generate data in real terms, it was explained.

Out of the 400 floats, India would have 150 and INCOIS has been selected as the regional centre to collect and analyse the data.

Already the Marine Satellite Information System (MARSIS) has been providing data on Potential Fishing Zones (PEZ). But with the floats sniffing for critical details like temperature, salinity and currents that have a bearing on feeding and breeding of fish, the picture of where to fish for a sizeable catch would be completed.

150 Indian floats are expected to be deployed in four years and these would ultimately lead to ocean modelling. This is important, according to Dr Harsh K Gupta, Secretary, Department of Ocean Development, because the seas would be the treasure houses of resources in the future.

Inaugurating the new centre of INCOIS, Gupta said the vision document on oceans would focus on three critical areas: what we know of the ocean, what we should know and what can be known in 10-15 years from now.

Dr. D.P.Rao, former Director of National Remote Sensing Agency (NRSA) said satellites too could play a major role in assessing ocean wealth. Prof. M. Ravindran, Director of Chennai-based National Institute of Ocean Technology said mapping the ocean was vital for the future.

Rajasthan Newsletter

From V.S.Durve

Creaion of the Department of Water Resources Management by merging irrigation, fisheries and PHE Departments.

Irrigation engineers in Rajasthan are now on war path against fisheries contending that one who owns dams should also be the owner of the water conserved by the dams and the animal resources (meaning fish) living therein. The contention is that fisheries should be merged with irrigation department and the new mega department thus created by merging part of PHE Department also be named as the Department of Water Resources Management. This measure would augment incomes from the various constituents of the proposed new department, besides bringing about curtailment in the expenditure on ministerial and administrative and office staff. The irrigation engineers say that, with the extra income of around Rs.6 crores per annum which the fisheries would contribute to the new department, they would be able to increase the dead storage capacities of the new reservoirs so as to provide more water for the survival of fish during summers. The irrigation engineers reinforce their argument by pointing out that in Madhya Pradesh and Orissa the irrigation departments have been renamed as water resources departments and this reform deserved to be followed by Rajasthan. A proposal to this effect has already been submitted to the Government of Rajasthan and, as per reports, it is under consideration.

Since the age-old concept of the use of water only for irrigation has now become out of date and not in tune with the present day needs, there should not be any objection in renaming the irrigation department as water resources department. There is now an emphatic and pointed emergence of water as of multipurpose usage and building dams now mean, developing water resources. However, there are several who point out that the idea of merging fisheries with irrigation to create a mega department is fraught with several concealed dangers.

Firstly, the proposed mega-department would be dominated by engineers and would become the domain of engineers and fishery scientists would be relegated to a secondary position. Both horizontal and vertical hierarchy is likely to be affected adversely with the merger of the two departments. The situation may further worsen with the partial merger of PHED. This situation would create bitterness amongst the staff of all the departments. For all the administrative and financial purposes, fisheries would be ruled by engineers who have no knowledge of fishery science and technologies.

Fishery does not mean only fish stocking and rearing as envisaged and understood by irrigation engineers. It encompasses several aspects such as developing fish-farms and hatcheries, marketing of fish and fish-seed, import of quality fishseed of various types of fishes, care of fishseed to stocking size or fingerling size through farm management techniques, diagnosing and treating fish diseases appropriately etc. Besides all the above, a fishery scientist is expected to maintain catch statistics and advise the the Government on policy management of capture fishery, selective fishing etc.

On the development side, the fisheries department looks after fisheries cooperatives, extension programmes and plans and executes centrally assisted schemes such as Fish Farmers' Development Agency (F.F.D.A.), Fishermen's Insurance scheme, developing model fishing villages and fishery estates. In general, the Directorate of Fisheries poises the state fishery policy within the broad frame work of the national fishery policy laid down by the Central Government and I.C.A.R. In an unwieldy department controlled predominantly by the irrigation department, the fishery developmental interests would suffer. All human activities are connected with water. On this ground, it cannot be contended that all departments need to be merged with irrigation department. In this context, the government has to ponder over the fact that no government any where in the world merged fisheries departments with irrigation departments, the reason being that irrigated water has a place in fisheries only, *vis-a-vis* capture fishery development. The role of irrigation department is extremely limited in respect of culture fisheries, hatchery work, fish farms etc., and managing the above measures and activities by non-fisheries chiefs would be impossible in the unwieldy mega-department.

Further, though there is a ministry of water resources in the Central Government, fisheries is with the Ministry of agriculture for obvious reasons. The Indian Council of Agricultural Research (I.C.A.R.) which controls nine fisheries research and educational Institutes, besides an equal number of fisheries Colleges, is also a part of Agriculture ministry. Even in Madhya Pradesh, Fisheries department and M.P. fisheries Corporation are independent entities and in no way within the water resources department.

What is required is the understanding and co-operation between the two departments. There should be a water utilisation committee at each district level. The district irrigation, fisheries and P.H.E.D. officers may be the members of this committee which will regulate the water use and co-ordinate the activities of all the departments in respect of water use. For any specific alteration or changes in anicut designs, water distribution, maintenance of water levels or impounding systems for fisheries purposes, these would have to be paid for by the fisheries department from their earnings or grants. Introduction of a system on the above lines would be better and likely to be of interest to the fisheries department than the outright merger as proposed by the irrigation department.

Government of Rajasthan may keep this proposal from the irrigation department open for debate amongst all concerned before taking a view on the proposal.

Tamil Nadu Newsletter

From R.JAYARAMAN

New islet formed off Tuticorin

A group of fishermen who were returning home after completing fishing operation stumbled on a 500 metre long and 100 metre wide islet at a point around 25 km east of the town in the early hours of September 2.

The elders fear that the formation of the islet could be the precurser of a gradual shrinkage of the sea and the event may possibly have an adverse effect on fishing. The head of the Geology Department, V.O.Chidambaranar College in Tuticorin city, Dr.N.Ramanujam, has explained the scientific reasons for the sudden appearance of the islet.

"Though the formation may be an astonishing feature' for a commoner and fishermen, it should not be forgotten that as many as 20 islands including Van Theevu, Koswari, Nallathanni, Valai, Upputhanni and Kurusadai islands in the Gulf of Mannar exist between Tuticorin and Pamban. There was none on the south of Tuticorin till the week before the new islet was found", he said.

From Kanyakumari to Rameswaram, there are many compartments of beaches each having narrow ends bounded by headlands and broader middle portions. During the southwest monsoon, waves approach the shoreline at oblique angle. The wave configuration moves sediments along the shoreline, which is known as 'longshore drift'. The sediment loads carried by the shoreline currents are quite impressive and sometimes exceed 1000 cubic meters per day in the northward direction, he said.

Earlier, the excessive sediment load carried by the longshore currents was being deposited downstream of the Tuticorin harbour, thereby contributing to the formation of islands, he pointed out.

However, after the construction of the Tuticorin harbour, the 'sediment continuum is disturbed'. The blockage of sand flow by the over 3-km long breakwaters has deprived the sediment supply to the downstream side. The longshore currents in the upstream side of the harbour have kept the sediments in the form of suspension and deposited quite off the cove along Kayalpattinam coast thereby creating the new islet. During low tide, the islet is exposed fully and during high tide it is not so well exposed', Dr.Ramanujam explained.

Because of the blockage of the sand flow, the beaches in the north of Tuticorin have not only become narrow but also vulnerable to sea erosion. A recent study in the downstream side has revealed that the coast has been eroded by a width of 50 to 60 metres within a short span of 10 years, he said.

Marine Export in Troubled Waters

The September 11 strike against the US has resulted in further deceleration of the already sluggish marine products export trade in the State, though no indications of refusal of consignments or cancellation of orders from abroad are available.

While some seafood exporters attribute the problem to a general drop in the demand and a higher inventory over the past few months, indications are that harbour 'floor prices' have dropped considerably and fisherfolk in Tuticorin and Kanyakumari have adopted a 'go slow' approach. There are also reports of deep-sea trawlers at Visakapatnam being tethered to the jetty. There appears little possibility of a turnaround in the industry, which has already been facing competition from cultured shrimps from China, Taiwan and Thailand and suffering from an overall market recession.

The situation is dicey for buyers and sellers to determine price and quantity as it normally takes six to eight weeks for shipments to reach overseas buyers. With the possibility of a conflict in the region, exporters believe that military intervention might lead to closure of ports. According to Ravi, the Chennai Regional President of the Sea Food Exporters Association of India, it is natural for the foreign buyers to be wary of the situation because of the afghan crisis.

The Marine Products Export Development Authority reportedly thinks it is too early to accept any drop in the exports due to the sudden development consequent to the bombing of the World Trade Center Pantagon in USA, although there has been a general drop in the exports to the west. It considers that the impact could become discernable in the ensuing days. According to a report, the prices offered for 16/20 counts of shrimps was US $ 17.5 a few months back which had since declined to US $ 11.5. The market recession is reported to have led to about 30 % slash in the prices offered in the international markets for seafoods.

The marine products export from Tamil Nadu climbed up from Rs.1462.70 crores in 1999-2000 to Rs.2264.78 crores in 2000-2001 . There was an increase in the quantity of the exports too. Chennai and Tuticorin ports have been instrumental in routing the exports from Andhra Pradesh and Kerala although the exact quantity diverted is not known.

In Chennai fishing harbour, the prices offered for the marine species landed, particularly the export varieties like shrimps, squids, cuttlefish, etc., had plummeted by about 20 %, said Kuppan, President of the Kancheepuram, Thiruvallur and Chennai mechanized boats fishermen Association. According to him, about Rs.20 lakhs worth of fish and prawn are landed daily in the Chennai fishing harbour of which about 5 % is stated to be utilized for exports. The fishermen say that the prices for the export varieties have been decreasing day by day and this has become a disincentive for venturing into the sea. The fishermen elsewhere at places like Tuticorin, Rameswaram and Kanyakumari are no better. They also face the same problem and the problem becomes serious where fishermen spend

their entire time and effort for catching export varieties only.

The fisherfolk of Tuticorin, like their counterparts in other coastal districts, remain in the sea for about 19 hours to eke out a living. Yet, of late, they feel like fish out of water due to local as well as global factors. According to sources in the fisheries sector, two major factors have contributed to this sorry state of affairs. One is depletion of fishery resources in the region mainly owing to change of water currents and the other being the dwindling exports in the recent past. And the lukewarm response from the international buyers in the wake of September 11 attack in the US came as the last straw.

The magnitude of the problem could be gauged from the fact that about half of the 260 strong fishing fleet in Tuticorin has not ventured into the sea for fishing operations during the last one-month although the peak season would be over by October. Even the remaining mechanized boats, as many as 2700 'vallams', 1400 catamarans and 125 fibreglass boats, which set out to the sea everyday, return to the shores only with a meagre catch.

From July to October, the mechanized boats, depending upon their size, used to garner a daily catch of about 30 to 100 kg of shrimps per boat besides 500-700 kg of cuttlefish, fetching a price of Rs.200 to 450 for the first grade shrimps and Rs.25 - 70 per kg for the two varieties of cuttlefish everyday. Now the boats reportedly bring about 30 kg of shrimps only a day on an average which does not make both ends to meet. The fishermen say the income they have been receiving is not sufficient even to meet the operating expenses like fuel, labour and food expenses.

The sudden slump has come as a rude shock to thousands of fishermen and people who depend on the trade for their living. Only five months ago they recommended their fishing operations after having suspended it for 45 days following a government ban on fishing activities from 15 April to 29 May last year. The government clamped the ban so as to conserve the dwindling marine fishery resources and to allow the fish to breed and grow.

It is claimed that the local exporting units have suggested to the boat owners either to stop or minimise fishing operations as they would not be in a position to offer a good price to the catch. There are 19 marine products export units, including the four EU approved ones in Tuticorin region and almost all the exporters have reportedly become wary of global developments in the US which have led to talks of another world war. They pointed out that the exports were more or less steady till August last and they nose-dived since then, much ahead of the attacks on US, owing to international competition.

The monthly export of frozen shrimp, which is the single most important commodity in our marine products export basket reveals the state of affairs. The monthly export of frozen shrimp through Tuticorin port went up from the level of 986 t in April to 1736 t in August. The price offered went down subsequently. The price for shrimps was US $ 18.60 for 16/20 count in August for the shrimps exported from Tuticorin which came down to $ 10.00 in September for the same grade.

It is reported that following the September 11 incident, no single shipment of shrimp export through the Tuticorin port took place. Not only that, the overseas buyers have been maintaining a stoic silence to the enquiries of the exporters in the region. The fishermen and exporters fear that if the trend continues it will throw the fishery sector out of gear affecting all the sections in the trade.

Coast Guard nabs Five Sri Lankans

Five Sri Lankans who entered Indian waters with 'doubtful intentions' were apprehended and their fishing boat seized by the coast guard off Tiruchendur coast on 14 Sept. A joint interrogation by the customs and the Directorate of revenue Intelligence, the Intelligence Bureau, the district administration and the coast guard would throw real light on the intentions of the crew, the Deputy Commandant A.P.Badola said.

The crew of the boat,'Bethlehem' belonged to Talavilai on the island. All of them - Joseph Aloc Fernando (43), Ranjit Ranganathan (45), Antony Fernando (48), Patrik Pereira (40) and Ravi Fernando (43) - were charged under section 15 (c) of the Maritime Zone of India Act, 1981 (failing to produce documents) and section 3(2) of the Indian Passport Act, 1920 (entry into India without passport). They were handed over to the Thermal Nagar police station, Tuticorin.

The coast guard ship, Ahalyabai, on a patrol mission in the Gulf of Mannar, located the boat. Had not the coast guard vessel speeded up and stopped her from fleeing, the boat would have quietly reached Indian shores within six hours, said the Deputy Commandant Badola.

Unlike in earlier instances, in which Sri Lankan fishing boats used to enter the Indian Exclusive Economic Zone (EEZ) only upto 7 nautical miles due to some 'navigational error', this time the boat entered deep- 18 nautical miles- into the Indian waters, said Deputy Commandant Donny Michael.

The boat was 'rudimentary' while the fishing vessels captured earlier were well-equipped and bigger in size. Though the crew claimed that they had left Sri Lanka on 13 Sept on a fishing mission, the boat had 'nil catch'. The possibility of their indulging in 'nefarious activities' could not be ruled out, said Deputy Commandant Michael.

Nor was there any navigational or communication equipment barring a magnetic compass, Deputy Commandant Badola said. This only showed that the crew was familiar with the location.

Six fishermen hurt in Lankan Navy firing

Six fishermen from Rameswaram were injured when personnel of the Sri Lankan Navy fired at them indiscriminately on 30 August. The injured fishermen reached Rameswaram the next day.

According to reports, Vijayan (37), Ilayamperumal (40), Arumugam (22) and Muthumuniyandi (25) from fishing villages in various coastal area of Ramanathapuram district had set out on a mechanized boat on 29th August. While

they were fishing at mid-sea their boat developed some mechanical problems and was stranded.

Muthumuniyandi got into another fishing boat, which was fishing nearby and came to Rameswaram. He told the owner of their boat about the problem and Shanmuganathan, the owner of the boat, along with Saravanan and Muthumuniyandi left in another boat to bring the crippled boat back home.

While the boat was being towed back to Rameswaram, a Sri Lankan Navy vessel began firing indiscriminately. The boat under repair was riddled with bullets and sank. All the six fishermen in the rescue boat also sustained bullet injuries.

Vijayan and Ilayaperumal were admitted to Rameswaram Government Hospital while Arumugam, Saravanan and Muthumuniyandi were hospitalized in Ramanthapuram. Shanmugam was treated as an outpatient.

Fisheries Minister Rajendra Prasad disclosed in the Assembly on 3rd September that the state government had been taking every possible step to ensure safety of Tamil Nadu fishermen from Sri Lankan navy in the future.

Replying to a special calling attention motion moved by T.Mani of CPM, I.Ganesan and G.K.Mani of PMK, Kumaradas of TMC, Renganathan of TMC Democratic Forum, Santhanam of AIFB and Austin of MGRADMK on the attack on the Tamil Nadu fishermen of Rameswaram coast by the Sri Lankan navy, Rajendra Prasad said that the state government had taken a very serious note of the issue. He said that four fishermen were stranded in a boat off Rameswaram coast on August 29 when their boat developed a technical snag. Three others reached the place on the high seas on August 30 to repair the first vessel.

At this stage the Lankan Naval vessel came to the spot and attacked the fishermen indiscriminately despite their surrendering before them pleading for mercy. In the attack, the first boat sank. While one person escaped unhurt, others sustained injuries. The condition of two of them was serious. They were undergoing treatment in Ramanathapuram Government Hospital, he said.

Earlier, moving the petition, T.Mani, Austin and I.Ganesan said that the Sri Lankan attack on Tamil Nadu fishermen had become a regular affair. Kumaradas, Santhanam and Renganathan urged the state government to take up the matter with the Central government. They also stressed the need for retrieving the Katchatheevu from Sri Lanka to avert the recurrence of similar attacks. The members also called upon the state government to provide immediate relief to the affected fishermen.

Later, the Labour Minister Anwar Raja visited the injured fishermen at the Ramanathapuram Head quarters Government hospital along with the district collector, S.Vijayakumar.

Bids invited for fishing rights

Quotations for fishing rights for three years upto June 2004 in tanks under the department of fisheries (inland fishing) in Theni district have been called for by the district Collectorate. The fishing rights over Veerapandi Kannimar temple tank, Muththevanpatti Kannimar tank, Seelayampatti small tank, Kullappuram big tank, Lakshmipuram karisalkulam tank, Lakshmipuram Sengulam tank, Theni Allinagaram mandhaikulam tank, Allinagaram Meer Samudarm tank, Ganguvarpatti mathuvarkulam, Andipatti sakkiliankulam, ganguvarpatti sengulam tank have been notified for auctioning fishing rights over them.

42 Chennai fishermen abducted

In the early hours of 19th September, the so called 'sea pirates' abducted 42 fishermen of Royapuram, Chennai when they were in the mid-sea on 'stay fishing'. This is the sixth incident in the past 37 days and in all these incidents 51 boats and 306 fishermen had so far been kidnapped by persons from Andhra Pradesh, stated to be for collecting huge ransom from the owners of the boats operating from the Royapuram fishing harbour.

A team comprising Assistant Commissioner (crime) Inbasagaran, Inspector Durairaj, Joint director of fisheries Thillai Govindan, Kanchipuram, Chennai and Thiruvallur districts mechanized boat owners federation president M.Kuppan rushed to Andhra Pradesh and held talks with the fisheries officials and people who have kidnapped the boats along with crew.

According to sources, the fishermen, who were fishing off the coast of Pennarpalayam in Nellore district were kidnapped. The 'pirates' started their operation early in the morning and the first boat was detained by some of the villagers around 4.30 am who came in three catamarans posing as 'fishermen'. The capturing continued in the mid-sea until 6.30 pm by which time they could capture 7 boats and 42 crew. All the boats and crew were later taken to Pennarpalayam village where they were beaten up.

Such incidents have been taking place often in the recent past and the Chennai fishermen fear for their life whenever they entered waters of Andhra Pradesh.

Royapuram MLA and Electricity minister D.Jayakumar said that two committees set up for the purpose of averting such incidents have been activated to function more vigorously. One committee consists of officials and the other comprises fishermen.

Shrimp farms defy SC order

Tamil Nadu Grama Swaraj Movement plans to take out a rally against intensive aquaculture that has been rampant despite a Supreme Court ban on it along the coastal districts of Thanjavur, Nagapattinam and Tiruvarur. The SC banned aquaculture activities along the coast within 500 metres from the coastline. Though later stayed the order, the SC in its subsequent directive it said that only extensive or modified shrimp farming can be undertaken.

S.Jaganathan of the movement said that 30,000 acres of land have been brought under shrimp/prawn culture in the Cauvery Delta Zone and in nearly one lakh acres all over the state.

Uttar Pradesh Newsletter

From **Sunit Kumar Singh**

NRCCWF's Initiative in Transfer of Technology

National Research Centre on Cold Water Fisheries (NRCCWF), Bhimtal, has taken the initiative to extend the hill carp farming technology to local people of hilly areas in order to stimulate interest in them for carp farming which will yield good income to them. The activity was started at Bhimtal and Champawat. In Bhimtal Block seven farmers' ponds and another eight farmers' ponds in the Pati Block of Champawat district were selected for implementation of extension programme.

Various ponds were stocked with seed of common carp, silver carp, grass carp and also the indigenous fishes i.e., Snow Trout and Mahseer. An estimated production range of 1700 - 1950 kg/ha was obtained from these ponds within a period of 8 - 10 months by regular feeding with supplementary diet and by adopting suitable management practices in both the blocks of Bhimtal and Pati. This technology initiated by NRCCWF is expected to open up new possibilities for aquaculture in hills.

Conservation of Golden Mahseer by NRCCWF

NRCCWF continued its efforts to produce the seeds of Golden Mahseer and raise them to advanced fry stage as a measure to strengthen conservation efforts related to this fish. In this regard, the seed was stocked in a phased manner in different Kumaon lakes and other fish depleted stretches in local streams.

Aquatic Biodiversity in Kumaon Himalayas

Biodiversity is becoming an important issue globally. Among the aquatics, biodiversity information on Himalayan aquatic resources is meagre. For generating scientific information on Himalayan aquatic biodiversity, NRCCWF started survey programme in a phased manner. The first phase of survey was started in Kumaon region. Most of the Kumaon region is drained by the Kali river system with its major tributaries i.e., Dhauli, Gori, Saryu and Ramganga. All these tributaries were recorded to harbour the potential fishery of snow trout *Schizothorax richardsonii* during winter season. The fishes like *Tor putitora, Garra* spp. and *Labeo* spp. were the other fishes recorded during the survey.

Urgent need to create Awareness about Biodiversity Conservation

There is an urgent need to educate the people about the need for biodiversity conservation in U.P. It has been observed that in most of the natural streams indiscriminate and illegal fishing practices are going on in most of the districts of U.P. Fishermen do not follow the mesh size regulation. So much so, young ones are also caught and sold in the market. Due to overexploitation, many fish species are becoming vulnerable. As per the rules and regulations of the fisheries department of the U.P. State, Fishing is strictly banned in monsoon season, but the ban is mostly violated. This indicates that, first, State Government should take strong steps for implementation of fisheries laws in U.P. and secondly, NGOs and State fisheries department officials should organise mass awareness programmes on importance of fish biodiversity conservation at village, block and tehsil levels.

Achievement in Breeding of Endangered Hillstream Carp *Labeo dyocheilus* at N.B.F.G.R. Lucknow

Dr. U.K.Sarkar, Scientist at National Bureau of Fish Genetic Resources, Lucknow, and his team members have succeeded in breeding the endangered hill stream carp, *Labeo dyocheilus*. Among the coldwater fishes, the medium carp *Labeo dyocheilus* is one of the most important food fishes in hilly areas. There has been a sharp decline in the population of *Labeo dyocheilus* in the Himalayas due to habitat destruction, destruction of breeding grounds and mass killing of young and adult fishes by dynamite and poisoning. This species is categorized as vulnerable (Vu) according to IUCN categorization.

The induced spawning of this fish was carried out in the Kosi river located in the area of Corbett National Park in collaboration with the Corbett Foundation, an NGO at Dhikuli, Ramnagar. The park extends over 521 sq.km., of which 312.86 sq.km., lie in Pauri Garhwal district and 208.14 sq. km., in Nainital district. The altitude of the area ranges from 400-1,100 meters above sea level.

The brood fish were collected by netting from the pool habitat of the river protected by the Corbett Foundation. Both the females and males were kept in a closed system (hapa) fixed along the side of the stream, where the current velocity was medium. Each fish was injected with a single dose of ovaprim. Both female and male were then released into a breeding hapa and a spray of water was provided to ensure oxygenation and to maintain optimum conditions for spawning. It was observed that all the females released viable eggs after 18 hrs. of injection. About 40,000 eggs were fertilized. The fertilized eggs hatched out after 13 hours and the percentage of hatching success was 70%.

As *L.dyocheilus* is one of the most important food fishes of the local people in the hilly region, it is very essential to conserve the natural stocks and improve the fishery. The present success confirms that the species can be bred and ranching programme can be undertaken with the help of NGOs for the benefit of the community as well as for conserving biodiversity in the Himalayan streams and rivers.

Two Senior Scientists join NBFGR

Dr.K.K.Lal and Dr.Vindhya Mohindra have recently joined as Senior Scientists in the Fish Genetics & Breeding division of N.B.F.G.R., Lucknow.

Integrated Fish Farming Training Course in China

Dr. R.S. Chauhan, Assistant professor (selection grade), College of Fisheries, Pantnagar, participated in an international three-month training course on "Integrated Fish Farming", held at Asia-Pacific Regional Research and Training Centre, Wuxi, China from April 10, 2001 to July 8, 2001. The course was sponsored by the Ministry of Foreign Trade & Economic Cooperation, Republic of China, in co-operation with NACA and other developing countries. In all, 35 researchers, technicians and managers from 23 countries of Asia, Africa & Europe participated in this training programme. Chauhan had the honour of being the Chairman of the participants during the training programme. The training course content included lectures and practical classes on many aspects of modern aquaculture practices including induced fish breeding, pearl culture, cage and pen culture, shrimp culture etc.

Appreciating the course content and the impact of the programme, Chauhan highlighted the need for orgnaising such training programmes periodically, particularly for women. He appreciated the efforts made by NACA in this direction.

Dr. R.S. Chauhan delivering the Chairman's speech at the Closing Ceremony of International Training Course on Integrated Fish Farming. Setting next to him are Mr. Mias Weimin (Director of Asia-Pacific Regional Research & Training Centre) and Mr. Zhou Ziaswei (Programme and Operation Officer, NACA).

Low-cost Fishculture through Organic Waste Recycling: Demonstration by CIFA's ORP Centre, Allahabad

The Operational Research Project (ORP) Centre of Central Institute of Freshwater Aquaculture (CIFA), Allahabad, is actively engaged in organizing various demonstration activities in this region, with the aim of popularising organic waste recycling for low cost fish culture technology. With this objective, for the past five years, the centre has successfuly demonstrated the utility of biogas slurry, sewage water, Azolla (as biofertilizer), cattledung and paddy straw (in combination) and decomposed water hyacinth, as organic inputs in culture ponds to achieve sustainable fish production of 3-4 tonnes/ha/yr, with reduced operational cost, more specifically in rural ponds.

Pond having sodic soil but neutralised and converted as a productive pond by paddy straw & cattledung treatment by ORP Centre, CIFA, Allahabad, Uttar Pradesh.

For undertaking demonstration programmes, ponds are selected every year. It was noticed that in some village ponds such as those in Panwari and Gajapur the soil was sodic, which resulted in lower fish production in the range of 300-600 kg/ha/yr. In order to rectify this problem, ORP Centre of CIFA demonstrated to the farmers through concerted efforts the technology to be followed for enhancing fish production. Eight ponds having a total area of 5.3 ha were treated with paddy straw and cattledung. Regular application of this mixture (paddy straw + cattledung) neutralised the sodic effect of the soil. As a result of the demonstration, the ponds which were virtually unproductive and lying waste have now been turned out to be highly productive and owners of these ponds are obtaining a production of about 4.0 tonnes/ha/yr. This simple and cost-effective technology is now being transferred for application in other fish ponds of low productivity.

The Centre also participates in various training programmes of FFDA i.e., Fish Farmers meet, Radio talks, exhibitions etc., conducted in the area. Dr. Suresh Chandra, Officer-in-charge of ORP Centre, CIFA at Allahabad has the distinction of imparting a new and purposeful direction aimed at transfer of production technologies for the benefit of fish farmers in the region. The new direction given by ORP centre of CIFA and the resultant prosperity are clearly visible in the region, leading to a spread effect.

Fish Marketing Centre in Lucknow

The livestock and Fisheries Development Minister Uttar Pradesh, Mr. Fagu Chauhan, introduced a scheme for the establishment of Government-run fish marketing centres in Lucknow. These are aimed at ensuring organised marketing of fishes in good condition to the people.

Fish marketing centres have been already established in many district headquarters of Uttar Pradesh, such as Allahabad, Ghaziabad, Gorakhpur and Bareilly.

Mr. Chauhan also said that thirty seven thousand fishermen will be covered under fishermen insurance scheme this year.

Inaugration of Shekhar Fish Hatchery, Gorakhpur

Shekhar fish hatchery is situated in village Phulwaria, block - Bhatparrani, district Deoria, U.P. A newly constructed fish hatchery in this region, it was inaugurated on Aug 14, 2001 by Mr. Mukesh Meshram, Chief Development Officer, Deoria. The Assistant Director Fisheries, Mr. B.N. Rai, said that it was the fifth fish hatchery of the district Deoria. Explaining about the hatchery, the Assistant Director said that it was designed for optimal production results, based on advance fish hatchery techniques. He said that the owner of this hatchery, Dr. C.S. Singh, ex-dean, College of Fisheries Science, Pantnagar is a well known fisheries scientist of international repute and the hatchery is set for successful operations and to be a model fish hatchery in the State for others to emulate.

Dr. C.S. Singh, spoke at length on fish production and fish seed production technology on the occasion and was heard with rapt attention. Dr. C.S. Singh laid emphasis on integrated farming, as it would generate higher profits, while also ensuring effective utilisation of resources.

The inaugural function was largely attended, most of the participants being fish farmers.

Corrigendum

SWOT Analysis of Indian Marine Fishing Industry

In August 2001 issue of *Fishing Chimes* (Vol 21 No.5) pages 45 - 48, an article with the above mentioned caption, authored by B.Ganesh Keremane and B.K. Naik was published.

The particulars of World Fish Production were given in Table-1 of this article at page 45. In this Table, in advertantly, fish production in all countries other than those mentioned, was inadvertantly not printed. In view of this, a revised Table 1, in complete form, is given hereunder, in substitution of the Table 1 of page 45 of August 2001 issue of *Fishing Chimes*. The inconvenience is regretted.

Table 1: World Fish Production

Country	*1998*	*1999*	*Difference*
China	17,229,927	17,240,032	+0.06%
Japan	5,263,384	5,176,460	-1.65%
USA	4,708,980	4,749,645	+0.86%
Russian fed.	4,454,759	4,141,157	-7.04%
Peru	4,338,437	8,429,290	+94.29%
Indonesia	3,964,897	4,149,420	+4.65%
India	3,214,765	3,316,815	+3.17%
Chile	3,265,383	5,050,528	+54.67%
Others	27,150,045	27,152,505	+0.009%
Total	73,590,577	79,405,852	+7.90%

National Symposium on Fisheries Enhancements in Inland Waters - Challenges A head

21-22 January, 2002 : CICFRI, Barrackpore

The Inland Fisheries Society of India, in association with the Central Inland Capture Fisheries Research Institute, Barrackpore-743101, Kolkata, West Bengal, has announced the captioned Symposium to be held on 21-22 January 2002 at CICFRI campus, Barrackpore. The technical schemes to be covered at the Symposium are a) Biological and Environment implication of enhancements, b) Resource based approach and development strategies, c) Socio-economic aspects of enhancements and d) Institutional arrangements. The objectives of the Symposium are to review the current status of inland fisheries enhancements in India and their importance to the fish protein supply and current management strategies and approaches, to prioritize the research needs in inland fisheries and to explore the possibilities of maintaining a continued dialogue and exchange of information among researchers, planners and managers involved directly or indirectly on fisheries enhancements. The registration fees payable is Rs.300/- for Members of the Association, Rs.600/- for Non-Members and Rs.200/- for Students & Research Scholars. All efforts will be made to accommodate the participants in hostels/ Guest House at Barrackpore on a 'first come first served" basis.

For further Details and Registration Form contact:

Mr. R.A. Gupta
Convenor of the Symposium
C/o CICFRI, Barrackpore - 743 101
Kolkata, West Bengal.

West Bengal Newsletter

From **P.K. Samanta**

State Level Workshop on Strategies for Development of Sustainable Aquaculture in West Bengal

The Regional office of NABARD, in collaboration with the Sub-Regional center of MPEDA, organized a day long state level workshop on strategies for development of sustainable Aquaculture in West Bengal, at Science City, Kolkata on 31st January, 2001. The workshop was attended by Ms. Nita Chowdhury, Union Joint Secretary (Fisheries), Govt. of India at the time, Mr. N. Chaturvedi, Principal Secretary, (Fisheries) government of West Bengal, Mr. V. Venkatesan, Director, MPEDA, Mr. P. Das and Dr. S.K. Ghosh of NABARD. The other participants were resource persons/scientists from Central Inland Capture Fisheries Institute, Barrackpore, Institute of Wetland Management and Ecological Design, Kolkata and Executives of Shrimps Farms and hatcheries and CEOs of BFDAs & FFDAs, representatives of financial institutions, progressive farmers from different districts of West Bengal.

Mr. P. Das, General Manager, NABARD, in his welcome address, referred to the general scenario of the fisheries sector in West Bengal. In his inaugural address, Mr. N. Chaturvedi highlighted the recent setback to FFDA programme due to heavy floods in nine districts of the State. He opined that the damage had put back FFDA activities by 7-8 years. Indicating that the productivity had to go up, he emphasised in this context to explore possibilities of vertical expansion of the sector.

Nita Chowdhury, emphasised the need for formulation of the needed number of model schemes for fish farmers. She suggested that the repayment schedule for schemes should be flexible and designed in such a manner that it would match with the harvesting / production schedule. Responding to the State Government's request for liberal assistance to the flood-affected areas, she advised the Director of Fisheries, West Bengal, to prepare area-wise details of the farms affected by floods and send concrete revival proposals in this regard. She emphasized the need for close links between research institutes and fisheries directorate as these were necessary for transfer of technology to the field and for feed back.

Mr. Venkatesan, Director, MPEDA said that aquaculture sector in the new millennium had to develop and thrive and be sustainable, ensuring environmental integrity. In this context, he emphasised the urgent need for putting efforts from every quarter to make aquaculture sustainable. All over the world discussions and deliberations and efforts were on to make aquaculture sustainable and eco-friendly for its own sake than for any other cause. He opined that West Bengal held great potential for diversified aquaculture. Among the coastal states involved in shrimp culture, West Bengal with a production of 19,900 tonnes of tiger shrimps and 1820 tonnes of scampi annually, stood second only to Andhra Pradesh and accounted for about 25% of the country's cultured shrimp production of 86,000 tonnes. He also stated that the State had excellent potential for increasing the production from fisheries by adopting improved technology as laid out for sustainable production of shrimp by Aquaculture Authority. The sewage-fed fish farming practiced in the State was an excellent example of the beneficial side of aquaculture to improve the environment with economic gains. He pointed out that the most notable failure of those involved in aquaculture sector had been their failure to educate the public about the benefits of aquaculture.

Mr. D.K. Ghosal, the then Director of Fisheries, West Bengal, outlined the developmental activities being initiated by FFDAs and BFDAs. He said that efforts were being made to cover additional water bodies under scientific fish culture. He also stated that a survey of vested / non-vested water bodies would be done to plan development activities in the future.

Dr. A.S. Upadhyay, Dy. Director, Sub-Regional Centre, MPEDA, Kolkata, spoke on non-availability of good quality shrimp seed, absence of regulation in seed supply, non-existence of seed transportation system, non-availability of fish feed, non-availability of clear land lease policy, lack of scientific approach to optimize the productivity of shrimp through aquaculture, badly silted water resources, lack of control over stocking density, use of chemicals, hatchery operations, quality of seed, feed etc. Talking on strategies for augmenting production, he laid emphasis on ensuring quality of shrimp seed for higher production. He also suggested that a mechanism for regulating shrimp aquaculture and hatchery operations should be developed. He pleaded for the setting up of a mother hatchery with a capacity of 100 million PL-20.

Mr. Buddhadev Basu, Managing Director, C.C.Aqua (Shrimp and Prawn) Hatchery project, Digha related his experiences in the sector to the participants.

Mr. Sandeep Maity of Eastern India Prawn Farm, Midnapore shared his experiences in scientific shrimp farming with the participants. He was of the opinion that the technology available to the farmers at present was inadequate. In other countries R & D institutions were working very closely with the farmers, he said. With their knowledge of improved disease prevention methods in prawn culture and improved pond construction and management they have been able to stabilize bio security in their culture system, avoiding incidence of diseases. He stressed on the need for a strong and active R & D support to culture fishery enterprises. He also spoke on the need to avoid inferior quality of feed available in the market.

Saying that the problem of pollution had diminished and in any case no greater than other sectors, he deplored that the sector had been isolated and humiliated under undue vigil of the environmentalists. He asked whether the discharge from aqua ponds was more damaging than those from municipalities, industries on agricultural activities and whether violation of the coastal regulation zone was more offensive than deforestation, mining or building dams etc. As all other activities like feed manufacturing, hatchery operations, processing and trading of raw material as well as finished products were dependent on the successful performance of farming, he said that the farming activities should be stabilized on priority basis in the first instance. The financial institutions and insurance agencies should liberalize their financial policies in relation to farming sector to facilitate development of the sector. All the leading countries in aquaculture enjoyed such facilities, he added.

Apart from these, the lack of infrastructure facilities like electricity, transportation and conveyance and telecommunication, absence of soil testing and disease diagnostic centres add to the problems of farmers, he said. Concluding his talk, Mr. Maity sought cooperation from the all sectors for the development of aquaculture.

Mr. M.A. Fazel, General Manager, IFB Agro Industries Ltd. Kolkata spoke about the problems of production and processing of shrimp in the State. Once, referred to as a sunrise industry, it is now percieived to be a sunset industry. The issues attributed to this deplorable state were the lack of a regulatory mechanism and planning. The impact of Supreme Court judgment resulted in 80% of the units withdrawing from the scene which was already crippled by the outbreak of viral diseases. The sufferers were the aqua farmers. The situation led to shortage of raw material for processors. The 29 nos. of processing plants in the State were operating with only 15-20% of capacity utilization.

Table 1

Sl.No	*Particulars Quantitative*	*Loss/Damage*	*Valuation (Rs. in Lakhs)*
1.	Loss of Fish/Prawn	1,38,218 (mt)	41465.40
2.	Loss of fish seed	18,099 lakhs Nos	1454.26
3.	Damage to dwelling house	97,428 (full) 27,005 (partial)	6933.88
4,	Fishing Boats & crafts		28.25
5.	Fishing nets & tackles		221.92
6.	Infrastructure loss :		
	a) Damage to fishery roads		281.00
	b) Tube wells damaged		65.45
	c) Govt. fish farms	1179	22.05
	Total		**50,472.21**

The proposed cost of restoration of fishery sector in WB had been estimated at Rs.14456.75 lakhs under the above items.

Dr. Manas Kumar Das, CICFRI, Barrackpore delivered a talk on prevalence of disease in aquaculture and strategies to combat it. He spoke on the ecological status of water bodies. While these bodies were a good habitat for fishes, the problem of incidence of diseases in India with special reference to West Bengal, would have be totally extinguished. For this diagnosis of diseases, quarantine regulations, management of aquatic environment and methods of prevention of diseases were important.

Dr. Utpal Bhowmick, CICFRI, Barrackpore, spoke on prospects and problems in freshwater prawn farming in the State. He said that there was a distinct gap in knowledge, skill, and attitude among the farmers and these required attention.

Mr. Milon Sinha, Crown India Aquaculture Farm, Naihati, 24 Parganas (N) talked on the scope for culture of alternate species viz. *Pangasius* spp, *Clarias batrachus* etc., for diversification of aquaculture.

Dr. Netai Kundu, of Institute of Wetland Management and Ecological Design, Kolkata spoke on the problems and prospects of sewage fed aquaculture in East kolkata WetLand.

Mr. B.N. Raychowdhury, Chief Officer, Uniter Bank of India, answered queries from farmers regarding financing fisheries schemes.

NABARD's Assessment of Flood damage in Fisheries Sector and steps for Restoration of damage

According to the assessment of the Regional office of the National Bank for Agriculture & Rural Development (NABARD), which started furactoning from 18th September, 2000, due to unusual rainfall coupled with release of water from Mayurakshi & Damodar Valley Corporation System damage worth Rs.504.72 crores to the Fisheries Sector was caused Table 1. The flood affected 69,81,098 ha of water area in the nine flood affected districts namely, 24 - pargana's (North), Midnapore, Howrah, Birbhum, Murshidabad, Hooghly, Bardhaman, Nadia & Malda. The water area affected was : under FFDA (36,90,300 ha), NCDC (3,61,482 ha) and others (28,59,498 ha) respectively. A larger share of the affected water area under aquaculture was under scientific farming developed under FFDA programme (58%) . The water area developed under NCDC programme and others was utilized for extensive aquaculture operation.

Ornamental Fishculture as a cottage industry in the Amtola area of South 24-Parganas

Breaking away from tradition, the villagers of Udaynaryanpur in the Amtola area of south 24-parganas distirct of West

Bengal have made great stride in ornamental fish culture, indering into cottage industry. In fact, villagers have made the business of ornamental fish culture as their monopoly, deviating from conventional fish culture. With active support from the State Fisheries Department, villagers formed Amtola-Udayanarayan Ornamental Fishing & Marketing Co-operative society. The head of the co-operative society, Mr. Madhai Mondal said that since 1994 almost 300 families under the Co-operative are earning their livelihood through ornamental fish culture. Even female members of the families actively participate in this community project.

In fact, the project began with loan from Fish Farmers Development agency of the State Fisheries department as well as from NABARD. Since freshwater is needed for freshwater ornamental fish culture, the co-operative society has dug two deep tube wells in the village for the purpose. The village also has about 20 ponds. The treatment of water in these ponds is done with methylene blue and malachite green in a routine manner with the help of the Fishery Extension Officer of the area Mr. Debashis Khatua. They use this water for production of ornamental fish seed. Cultivation of fish in fibreglass tanks is by far the most popular method and almost 70% of the cultivation in the village is done in such tanks. On an average, each family has about 15 tanks where bulk of the activity is carried out.

The Co-operative produces about three lakh seeds each day but the production level can be stepped up considerably to meet market demand. Acute shortage of dry feed is one of main constraints in ornamental pisciculture activity. Lack of good variety of parent stocks also adds to the problem for the production of good quality seed. In order to flourish, proper marketing facility would have to be developed.

Unlike Mumbai, export channels for ornamental fish are not so well developed in Kolkata although ornamental fish has a big international market. In spite of selling only in domestic market, each of the 300 families earn no less than Rs.5000/- month and income often touches Rs.10,000/- month in a family. Obviously, this has given a big fillip to the economic activity of the village.

Association of Indian Fishery Industries

Executive Council Members and New Office Bearers: 2001 - 2002

The following were elected to the Executive Council of the Association of Indian Fishery Industries at the general body meeting of the Association held on 25/09/2001 at Visakhapatnam.

Ordinary Members

1.	Mr. T. Raghunath Reddy	:	M/s. Suverna Rekha Marines P.Ltd.
2.	Brig. S.K.Aggarwal	:	M/s. Sagarika Sea Crafts Ltd.
3.	Mr. M. Sivaram	:	M/s. Samro Food Processors P.Ltd.
4.	Mr. B. Srinivasa Rao	:	M/s. SBS Marine Exports Ltd.
5.	Mr. T.I. Victor Fernando	:	M/s. Reeda Marines P.Ltd
6.	Mr. Y. Surya Rao	:	M/s. Devi Fisheries Ltd.
7.	Mr. N.S.R. Murthy	:	M/s. Nekkanti Sea Foods Ltd.
8.	Mr. M.V. Krishna Rao	:	M/s. VBC Exports Ltd.
9.	Mr. C. Kumar	:	M/s. Saravanan Marine Pdts. P.Ltd.
10.	Mr. J. Arul Roy	:	M/s. Crown Fisheries P.Ltd.

Associate Member

1. Mr. J.V.H. Dixitulu : M/s. Fishing Chimes.

The Executive Council elected the following as the Office Bearers for the year 2001-2002.

President	:	Mr. T. Raghunath Reddy
Vice Presidents	:	1) Brig. S.K. Aggarwal
		2) Mr. M. Sivaram
Secretary	:	Mr. B. Srinivasa Rao
Treasurer	:	Mr. T.I. Victor Fernando

Forum for Education-Development, Mysore

Clarification on its Advertisement in September 2001 issue of *Fishing Chimes*

Mr. N. Nanjegowda, President, Forum for Education-Development, Mysore, Karnataka, has highlighted four Tenets of his Forum, (in an advertisement at page 63 of September 2001 issue of *Fishing Chimes*) one of which was to encourage people to take to fish culture, as this activity is both profitable and food providing and as consumption of more of fish keeps people healthy and active.

We congratulate him for his efforts with Missionary zeal to educate the common man about the nutritional benefits of consuming more of fish compared to other animal foods.

His initiative to insert the advertisement in public interest outlining the tenets of the Forum and with an exhortation "Render the Nation Fishful" displays his devotion to the cause. However, as a dampener to all his efforts in public interest, we regret to say his name was inadvertently spelled wrongly as "N. Janjegowda", in the advertisement. Readers may kindly note this error and read the name as "N.Nanjegowda". The inconvenience is regretted. We apologise to Mr. N. Nanjegowda for the inadvertance.

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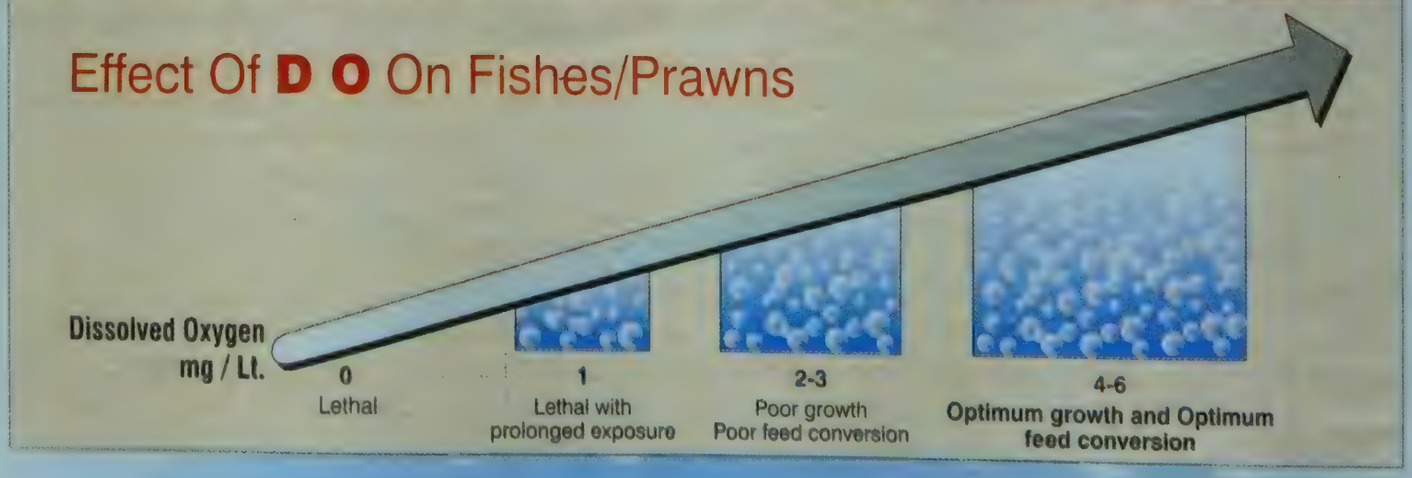

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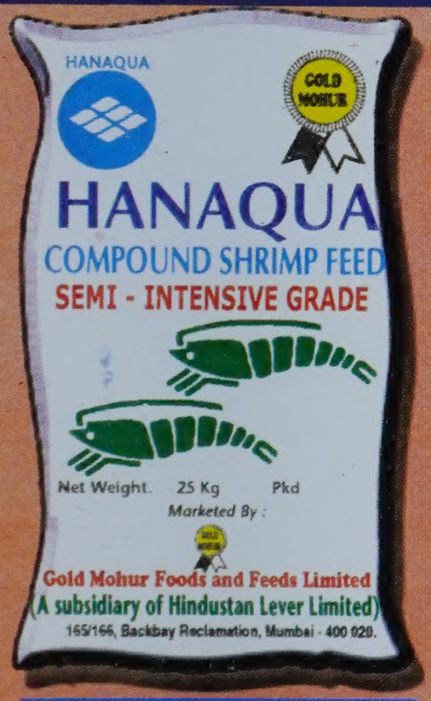

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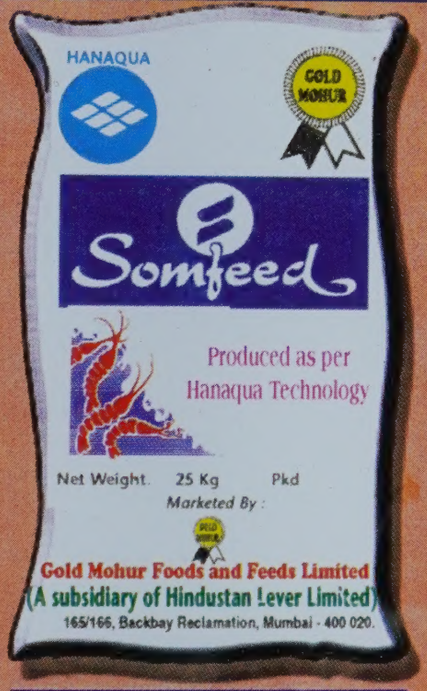
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